Prediction of recidivism in a Tasmanian population: Evaluation and development of community based risk assessments

Heidi Dawn Gordon

BA (Hons.), MPsych (Clin.)

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Statement of Co-Authorship of Published Papers

The following people and institutions contributed to the publication of work undertaken as part of the thesis:

- Heidi Gordon, School of Social Sciences, University of Tasmania
- Dr Sally Kelty, School of Social Sciences, University of Tasmania
- Assoc. Prof. Roberta Julian, School of Social Sciences, University of Tasmania

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We the undersigned agree with the above stated ‘proportion of work undertaken’ for each of the above published/submitted peer-reviewed manuscripts contributing to this thesis:

Signed:

Heidi Gordon

Candidate

School of Social Sciences

University of Tasmania

Signed:

Dr Sally Kelty

Supervisor

School of Social Sciences

University of Tasmania

Signed:

Assoc. Prof. Roberta Julian

Sociology & Criminology Director

School of Social Sciences

University of Tasmania

Signed:

Professor Catherine Palmer

Head of School

School of Social Sciences

University of Tasmania

Date: 09.03.2016

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Abstract

In the realm of criminal justice, there are few aims that are more integral to their practices than the assessment and prediction of risk. Many correctional agencies utilise formal risk assessments to provide a structured guide in order to accurately assess an offender's risk of recidivism. In doing so, it is important that the assessments chosen are psychometrically valid and reliable, as well as jurisdictionally appropriate. Therefore, it is important to validate an international risk assessment within the population it is intended to be used, particularly as there are concerns about the applicability of using an international risk assessment within an Australian offender population. This thesis is comprised of three papers. The first two papers evaluate the utility and predictive validity of the Level of Service/Case Management Inventory (LS/CMI) within one Australian offender jurisdiction. This information was then utilised in order to develop and pilot a revised risk assessment (Australian Risk/Need Inventory [ARNI]) tailored for the Tasmanian offender population.

In study 1 of this thesis, the need profiles and validity of the LS/CMI was investigated for Tasmanian offenders serving community-based orders. The results of this study indicated that the LS/CMI had a weak discriminative ability (AUC = .664, 95% CI [.611, .717]) for non-Indigenous males (N = 569). However, it predicted recidivism in non-Indigenous female offenders (N = 113) at an accuracy level no greater than chance (AUC = .575, 95% CI [.433, .717]). For Indigenous male (N = 96) and female offenders (N = 29), the LS/CMI was not able to predict reoffending. The results for non-Indigenous females and Indigenous male and female offenders should be interpreted with caution due to the small sample sizes. These findings for non-Indigenous offenders are consistent with previous Australian and international research.

Study 2 aimed to investigate the factor structure of the LS/CMI using Australian offenders who were completing community-based orders (*N* = 302). The results of study 2 indicated that the LS/CMI Total score achieved excellent internal reliability. However, there is some concern regarding the capacity for the subscales to function independently. Factor analysis determined a two-factor solution at a subscale level (criminal conduct and lifestyle considerations), whereas a more diverse factor solution was obtained at an item-level. The LS/CMI was determined to be predictive of recidivism, but this was a weak effect (AUC = .621, 95% CI [.546, .696]). This suggests that the LS/CMI as it is currently used in this population may not be the most appropriate assessment tool, requiring further research before an international risk assessment is adopted in an Australian jurisdiction.

The third study presented in this thesis involved amalgamating the information obtained from the previous two studies in order to develop a risk assessment to be piloted within the Tasmanian Department of Justice. This instrument was piloted on offenders who were incarcerated or completing a community-based order (*N* = 301). The findings from this study indicated that from the original 78-item pool, 45 items added the most information in the development of the Australian Risk/Need Inventory (ARNI). The Cronbach's alpha for the total score indicated an excellent level of internal reliability ($\alpha = .93$). At a subscale level, the internal reliability ranged from excellent ($\alpha = .92$) to acceptable ($\alpha = .62$). In regard to the factor structure, a ten factor solution was identified. The ARNI total score and five of the ten subscales indicated a significant reasonable ability discriminate between offenders who did reoffend and those who did not reoffend within a six-month time frame.

The preliminary results of the ARNI indicated that it is able to identify recidivists within a Tasmanian offender population and is internally consistent. It is suggested that extending the sample size (including increasing the heterogeneity of the offender sample) and increasing the follow-up reoffending period may increase the predictive utility and sensitivity of the ARNI total and subscale scores in discriminating between lower- and higher-risk offenders. However, the results of the studies presented indicates that in order to conduct a more in-depth risk assessment, specialised assessments (such as those addressing substance use and instrumental aggression) also need to be conducted alongside the general risk assessment. This will provide the most comprehensive risk assessment process and will allow criminal justice agencies to utilise their limited resources efficiently and effectively.

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Introduction:
Crime in Australia: Prediction of recidivism in Tasmania

Crime in Australia: Prediction of recidivism in Tasmania

In the realm of criminal justice, there are few aims that are more integral to their practices than the assessment and prediction of risk. This affects decisions and case planning in relation to releasing prisoners on parole, as well as the requirements and intensity of supervision for those offenders completing community orders. There are many extreme cases that have received media attention, especially in regard to chronic serious recidivists in the community. For example, in September 2012, Australia saw the high-profile case of Adrian Bayley who attacked, raped, and strangled Melbourne woman Jill Meagher, before burying her in a remote location. At the time of Meagher's murder, Bayley had been on parole for rape and on bail for recklessly causing serious injury (Callinan, 2012). Extreme cases of this type of reoffending are not limited to Australia but also occur internationally.

Not all reoffending is as extreme as the Bayley case. For example, there are more victims of property crime (including breaking and entering, burglary, theft, motor vehicle theft, shoplifting and bag snatching), than violent crime in Australia. In fact, homicide rates in Australia have generally been decreasing over the last decade, and whilst assaults continue to represent the majority of recorded violent crime, the rate of assault victims is generally decreasing (Australian Institute of Criminology [AIC], 2014). It could be argued that accurate risk assessments help to identify recidivists which in turn, can enable more effective offender management in order to reduce rates of reoffending.

Risk assessment is an important step in criminal justice procedures as it aims to classify the individual risk of an offender re-engaging in criminal behaviours. This process helps to identify low-, medium-, and high-risk chronic recidivists. Whilst this information can inform any incarceration, parole, or community service order conditions, it also allows for an individualised case management plan to be developed. A good risk assessment should have evidence in relation to its psychometric properties (internal reliability and validity) and it should correlate with future recidivism, as well as identify criminogenic factors that influence an offenders' recidivism risk. A risk assessment should be able to identify specific criminogenic areas to provide conditions on the offenders' probation or parole release as well as identifying areas of intervention that could reduce their recidivism risk. Further, a specialised risk assessment, such as one for sex offenders, would be able to provide more information in regard to criminogenic risk and accessibility to sex offender programs, as well as ensuring adequate supervision and monitoring to protect public safety.

It is also important to note that while risk assessments play an important role in identifying an offender's level of risk in engaging in future criminal behaviour, it does not predict whether the offender will reoffend. While risk assessments are preferable to no assessment at all, they are not infallible and there will always be cases where offenders fall through the cracks. That is, an assessment may identify an offender as low-risk and the offender then goes on to become a chronic serious recidivist. Alternatively, an offender identified as a high-risk recidivist may cease to engage in criminal conduct due to targeted interventions and support provided through his/her case management program. As a result, the consideration becomes how much risk will criminal justice agencies, and as a result the community, tolerate when attempting to balance the rights of an offender with protecting the public safety from potential harm from future criminal acts?

Risk Tolerance and Risk Management

"Risk society" is a term coined by Beck (1992) and Giddens (1991) and refers to the manner in which modern society organises its response to risk. In particular, a risk society is one that is preoccupied with future and safety and this in turn generates the concern with risk. It is suggested that this preoccupation with risk, including hazards and insecurities, is a result of modernisation. Specifically, technological advances, as well as alterations in work conditions and organisations, has resulted in changes in societal characteristics, lifestyle, and in the structures of power and influence in the forms of political repression and participation (Beck, 1992). Both Giddens and Beck argue that humans have always been subjected to differing levels of risk, such as natural disasters, which were often perceived as the result of non-human forces. However, modern societies are now subjected to additional risks such as pollution and global warming, newly emerging illnesses, crime and terrorism, and financial risks especially since the global financial crisis (McKibbin & Stoeckel, 2009). Whilst active risk-taking may be seen as a core element of a dynamic economy and innovative society (Giddens, 1999), present society has become more preoccupied with protecting against risk in what may be considered conservative methods to minimise the chance of harm. Studies such as Mitchell, Cavanagh, and Eager (2006) suggest that efforts to lower risk in everyday society may indicate a trend towards preoccupation of risk protection intended to minimise harm.

Risk has always been related to identifying what can happen in the future. Risk analysis is used to inform decision-making concerning future welfare and includes identifying and protecting against unacceptable risks and hazards (Rausand, 2011). The term *risk* has both positive and negative connotations, including differing levels of tolerance and acceptability. Risk is a complex phenomenon which extends further than calculating the odds of a hazard, danger or event from occurring. Whilst previously being perceived as a value-neutral term, risk is now becoming increasingly politicised and value-laden depending upon the context in which it is used. The debate and conflict over risk is now extending into the public, political and private frameworks (Kemshall, 2009).

The *Oxford English Dictionary* defines risk as exposure to “the possibility of loss, injury, or other adverse or unwelcome circumstance” or “a chance or situation involving such a possibility”; that is, an exposure, or a chance of an exposure, to a positive or negative situation. However, the term risk can also extend beyond this to include, for example, the risk of gambling or insurance policies in which the odds are calculated or predicted and there is an attempt to protect against such risk. This has resulted in the development of mathematical models and statistical procedures that have formalised the probability and calculation of risk, and even the development of methods that attempt to tame the chance of risk (Hacking, 1990). Risk has had a key role in capitalism and economics and is acknowledged as a feature of entrepreneurship and venture capital. That is, those who are willing to invest capital (money) in high risk ventures have the potential to earn large monetary gains if such an investment succeeds, while risking large losses if such an investment is unsuccessful (Kemshall, 2009). Whilst risk assessment involves evaluating the level of risk presented, risk management acknowledges that some risk is always inevitable. It allows for the decision maker to determine what level of risk is tolerable under the circumstances and design the least restrictive environment necessary to protect public safety. Risk management places emphasis on dynamic factors that are amenable to intervention (Conroy & Murrie, 2007).

In regard to risk in the context of crime, risk tolerance refers to the need to balance the cost of responding to crime against the likelihood of victimisation. As a result, there are times when it is recognised that there is an acceptable level of risk, and that to act would involve a certain amount of loss in time, funds and resources (Kennedy & Van Brunschot, 2009). This may mean, for example, that when there are limited police resources and monetary funds for crime prevention, a government may decide that there is an acceptable level of risk that will be tolerated in certain areas. This could result in limited resources being in place in a low-risk crime area, and placing more resources in high-risk crime areas. It must also be acknowledged that crime will always be present and will never go away, which is also the case for other areas such as disease and environmental threats. However, this does not mean that the damage that results from crime cannot be reduced. The policies and procedures of criminal justice agencies, including risk assessments, are aimed at targeting risk to reduce crime and the resulting impact. Therefore, risk management is often double-edged as it balances the benefits of positive risk-taking against our risk aversion to the costs (not necessarily monetary) that can result from both addressing certain risks and becoming risk tolerant (Kemshall, 2009). In relation to crime, risk can also refer to those offenders with a higher probability of reoffending (Lowenkamp, Latessa, & Holsinger, 2006).

Crime in Society

Crime is a type of deviance regarded as a violation of societal norms. Crime has interested academics and policy makers as they attempt to identify why people engage in criminal behaviours and who is most likely to be at risk of offending. Most convicted offenders will be released into the community, either through a parole period, the conclusion of their prison sentence or engaged in community corrections supervision/programs. There is a societal expectation that the community will be protected against victimisation and the cost of crime (Glazebrook, 2010). Governments and policy makers have the task of determining effective measures and sentences in order to protect the community, whilst balancing the human rights and freedoms of the offender. An offender cannot receive an unjust or prolonged sentence in respect to his/her offence. Correctional agencies tend to focus their attention on trying to determine, or assess, an offender’s likelihood of reoffending and the risk that the individual may pose on his/her return and reintegration into the community (Ferguson, Ogloff, & Thomson, 2009).

One contentious area in criminology is the actual rate and level of crime that does occur. Published statistics that attempt to measure the level and cost of crime are often criticised as not reflecting the *true* level of crime. This is due to crime often going undetected, or not being reported by victims, especially in the case of sex-related offences or property offences when they are not required to be reported to insurance agencies (Howitt, 2009). Despite these limitations, the statistical information obtained from such analyses can be used to provide a current indication of reported crime trends in Australia (Hayes & Makkai, 2009).

Using such information can help inform policy decisions and funding to strategically target specific categories of crime, as well as whether certain crime types are declining or increasing.

In 2011, the estimated overall cost of crime in Australia was nearly $47.6b per year (Smith, Jorna, Sweeney, & Fuller, 2014). This is an increase of $11.6b from estimates provided in 2005 (Mayhew, 2003; Rollings, 2008). According to the AIC (2014) total net expenditure on corrective services in Australia, during the 2011-12 financial period approximately $3.8b was spent on corrective services, with $3.2b (85%) spent on prison services, $478m (12%) spent on community corrections and $103m (3%) spent on transport and escort services. During this same period a total of $82,538 was spent per prisoner nationally, whereas in comparison the national expenditure per offender in community corrections was substantially less at $8,227. For the 2011-12 period, for every $1 spent on community corrections per offender per day, $10 was spent on offenders in prison (AIC, 2014).

Determining whether an individual is at risk of reoffending has more than economic implications. There is evidence that a disproportionate amount of crime, particularly violent crime, is committed by the most persistent adult male offenders who account for a relatively small proportion of the total offender population. For example Yang, Wong, and Coid (2010) provide an estimate that about 50% of all crimes are committed by 5 - 6% of the offender population. Further, the AIC (2013) asserts that the recidivism rate of offenders who returned to prison after a previous incarceration has remained relatively stable over the past five years. From the AIC data obtained, of the number of prisoners released in 2009-10, 39% had returned to prison under sentence for a new offence, with a total of 46% returning to corrective services (including both prison and community corrections) by the end of the financial period in 2012.

A recent study by Goodwin and Davis (2011) examined engagement in criminal activities in six Tasmanian families that were known to police and corrective services. This study provided support for the intergenerational transmission of crime with a relatively large proportion of members in these families having at least one conviction, and/or having served a custodial sentence. In particular, regardless of gender, the more serious the parents' criminal record, the greater the probability of their offspring engaging in criminal activities in comparison to children of parents who did not have a criminal record. The father's criminal record appeared to have a greater influence than that of the mother's record. Addressing the needs of this population could help enrich the family's life as well as reduce the rate of reoffending and help break the cycle of crime within families.

In the field of criminology, it was not until the nineteenth century that scientists began assessing dangerousness. Lombroso, who led the Italian positivist school of criminology, developed the theory of atavism. This theory suggested that criminality was an organic anomaly, partly pathological and partly atavistic. Essentially, violent criminals could be identified through physical features, for example a sloping forehead, unusual ear size, prognathism, or excessive arm length (Ellwood, 1912; Beccalossi, 2010). As the positivist movement gained momentum, the twentieth century saw the change in focus from containing to treating criminals with the idea that rehabilitation could occur. However, as rehabilitation was deemed a lengthy process, sentences needed to be undefined. This model of rehabilitation continued into the 1970s (Conroy & Murrie, 2007).

Whilst Lombroso's theory of linking criminal behaviour to human physiology has long been discredited, the motivation to understand and identify what factors are linked to criminal behaviours still continues (Miller & Maloney, 2013). Much of the extant literature regarding crime explores the question of why people commit crime, and continue to reoffend, despite aversive consequences that may include imprisonment, monetary fines, and other penalties. Most of the developed theories can be collapsed under one of three broad theoretical perspectives of criminal behaviour (Gutierrez, Wilson, Rugge, & Bonta, 2013; Bonta, 2002). The first perspective includes sociological criminology theories that propose a link between the causes of crime and a person's location within a social structure. For example, those who are more closely bonded to social groups (including, for example, family, peers, school, and employment) would be less likely to engage in delinquent and criminal acts in comparison to those who are lacking these social ties (Bernard, Snipes, & Gerould, 2010). Whilst these theories are viewed as being persuasive in explaining why an individual would choose to engage in crime, research evidence indicates that these factors constitute relatively minor predictions of criminal behaviour (Andrews & Bonta, 2010).

The second broad theoretical perspective focuses on psychological factors related to criminal behaviour. The two main types of theories that fall under this category are that of intelligence, and those concerning personality and psychological pathology. Broadly, intelligence refers to the ability to learn and acquire knowledge and skills, as well as reasoning and applying this knowledge to situations (Kaplan & Saccuzzo, 2005). An intellectual disability is defined as an impairment in general mental ability that impacts the adaptive functioning across the conceptual, social, and practical domains that determine how well an individual copes with everyday tasks (American Psychiatric Association, 2013). Low intelligence, or intellectual disability, had been argued to explain criminal and delinquent behaviour. However, the debate between intelligence and criminal behaviour continues. For example, it has been suggested that there is no link due to IQ tests showing little or no difference between the intelligence of criminals and non-criminals (Bernard et al., 2010). However, Cantor, Blanchard, Robichaud, and Christensen (2005) indicate that research results into this area have been inconsistent. Their reanalysis of data from 236 samples indicated that adult males who commit sexual offences score lower on IQ assessments in comparison to males who commit non-sexual offences. Further, McGloin, Pratt, and Maahs (2004) suggest that there is an indirect effect of IQ on delinquency and that this is seen across school performance, deviant peer pressure, and self-control.

From a forensic mental health perspective it is argued that criminal behaviour is a result of psychological pathology. This may include, for example, low self-esteem, schizophrenia, antisocial personality pattern, and psychopathy. With the exceptions of antisocial personality and psychopathy in which there is a high association with crime and reoffending, the evidence for the psychological factors relating to recidivism is limited. It has previously been argued that such psychological variables only constitute minor risk variables in relation to criminal behaviour (Gutierrez et al., 2013; Bonta, Law, & Hanson, 1998). However, there continues to be an ongoing debate as to the role of psychological factors relating to recidivism. For example, research by Nielssen and Large (2010) indicate that the rate of homicide in the first episode of psychosis is higher than previously estimated, whilst the annual rate of homicide by patients with schizophrenia after treatment is lower.

The third broad perspective encompasses cognitive and social learning theories. One of the theories in this perspective is the General Personality and Cognitive Social Learning (GPCSL) model described by Andrews and Bonta (2010). This is a general theory of criminal behaviour that incorporates distal and biosocial factors (for example, neighbourhood and race/ethnicity) along with proximal factors (rewards and costs) that influence the probability of criminal behaviour. The big five personality traits, or the five factor model, acknowledge that there are five broad domains or dimensions of personality in which every individual can be located to some extent. These dimensions include neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness (Digman, 1990). These dimensions of personality are influenced by biology and heredity, interactions with the environment including social support, and cognitions which encompasses our attitudes, values, beliefs, rationalisations, and identities that either support or reject particular behaviours. The GPCSL model has received a lot of interest and empirical support and is a driving force behind many criminal justice policies and procedures. This model also informs the development of assessments in an attempt to measure and predict criminal behaviour (Poledna, Andreica, & Gusan, 2011).

The GPCSL model proposes that crime can be understood through considering the personal, interpersonal, and community relationships related to human behaviour, and exploring how these factors influence behaviour that is either favourable or unfavourable for crime. The model encapsulates the *central eight* identified risk and need factors that have been recognised as crucial in the prediction of criminal conduct. The central eight can be divided into the *big four* and the *modest four* factors. It is proposed that the big four are major influential variables in predicting and analysing the criminal behaviour of individuals. The modest four are considered to be other well-established risk/need factors that, while they are important, are less influential in comparison to the big four factors (Andrews & Bonta, 2010). The central eight are outlined in Table 1.

The central eight risk and need factors have received strong support for their predictive utility in assessing an offender's risk of reoffending (Andrews et al., 2011; Girard & Wormith, 2004; Wormith, Olver, Stevenson, & Girard, 2007). It is also important to consider that factors related to recidivism may differ from factors predisposing an individual to offending behaviour. Research (for example, Lipsey & Derzon, 1998) suggests that there are four main categories of risk factors: antisocial behaviour (physical violence and aggression, substance abuse, criminal activities, behavioural problems), personal characteristics (gender, ethnicity, IQ, psychological conditions and school performance), family factors (abuse, neglect, family criminality, poor parent-child interactions), and social factors (social bonds and association with antisocial peers). Factors that predispose an individual towards offending may include static factors, such as abuse and neglect experienced as a child and family criminality. However, dynamic factors may help to negate the risk of engagement in antisocial behaviour through, for example, association with anticriminal peers, strong positive social ties, and involvement in childhood abuse support groups (Andrews & Bonta, 2010).

Andrews and Bonta’s (2010) research has confirmed that the grand mean validity estimate for the major factors (that is; the big four factors) exceed that of the moderate four factors (modest four). Further, they added a minor set of factors which are associated with engaging in criminal activity, albeit to a lesser extent in comparison to the central eight factors. These minor factors include low verbal intelligence, personal emotional distress and/or psychopathology, fear of official punishment, social class origin, seriousness of the current offence, and other factors unrelated or only mildly related to offending.

Table 1

The Central Eight and Their Corresponding Descriptions/Indicators

The Big Four Factor	Indicator
History of antisocial behaviour	Early involvement in a number and an array of antisocial activities occurring in a variety of settings (e.g., home, school, public). Major indicators include being arrested at a young age, large number of prior offences, and rule violations while on conditional release
Antisocial personality pattern	Impulsive, adventurous pleasure-seeking, general trouble (multiple persons and settings), restlessly aggressive and a callous disregard for others
Antisocial cognition	Attitudes, values, beliefs, rationalisations and personal identity that are favourable to crime
Antisocial associates	Association with procriminal associates, including isolation from anticriminal others
The Moderate Four *Factor*	*Indicator*
Family/marital circumstances	Poor quality of interpersonal relationships including lack of supervision and inconsistent/inappropriate disciplinary procedures as a child. For adult relationships/spouses, linked with lack of caring, respect and interests, and procriminal expectations
School/work	Quality of interpersonal relationships within the school/work setting. Risk factors also include poor performance and involvement, and low levels of rewards and satisfactions
Leisure/recreation	Low levels of involvement and satisfaction in anti-criminal leisure activities
Substance abuse	Current problems with alcohol and other drugs (excluding tobacco) indicate a higher risk, rather than a prior history of substance abuse

*Adapted from Andrews and Bonta (2010, p. 58-60).

Recidivism and the Risk-Need-Responsivity Model

The term *recidivism* originates from the Latin word *recidere,* which translates to mean "to fall back on" (Payne, 2008). Recidivism is often used interchangeably with repeat offending, reoffending, re-arrest, and even in terms of failure when discussing offender programs. Recidivism can be defined as a tendency to relapse or re-engage in a criminal behaviour pattern (Moore, 2000). In criminological research, recidivism has generally been used to describe an individual reverting back to criminal behaviours that lead to a re-entry into the criminal justice system (Maltz, 1984).

Recidivism rates can be defined, measured, recorded, and analysed in a variety of ways. Recidivism rates can be recorded from different stages of the criminal justice process. This includes intake, re-arrest, court referral, adjudication, and sentence. Further, these rates can be collected over varying periods of time – from weeks, months, or years. The United States Department of Justice (Snyder & Sickmund, 2006) recommends that when researching recidivism rates, the widest range of system events that capture actual reoffending (for example, arrest, court referral, conviction, correctional commitment, and correctional status change), combined with sufficient information to differentiate offence severity, should be utilised to provide the most useful recidivism data. Further, recidivism rates should be collected and measured over differing timeframes, for example, comparing six months, with one- or two-year time periods.

It can be argued that the variation in recidivism rates in empirical studies may be due to how the term recidivism is conceptualised and operationalised within the various research investigations. Wormith et al. (2007) assert that there are various dimensions across which recidivism can be described. These include the operational criterion (e.g., arrest, charge, conviction or incarceration), the type of offending (e.g., violent, property, sexual, fraud, etc.), the source of the data (official records across local, state and federal databases compared to self-report), as well as the length of the follow-up period combined with the severity of the offence. Research that aims to investigate the predictive utility of dynamic risk instruments may wish to explore whether the assessment can adequately capture risk over differing periods of time. This may be influenced through the assessment's ability to discriminate acute risk factors in the short-term before the interaction of other factors such as program completion, which has an impact on an individual's recidivism risk (Wormith et al., 2007).

An assessment of an offender's recidivism risk can impact upon the individual in various ways. This includes affecting what cases are presented before the courts, what sentence an offender receives, as well as what happens to offenders once he/she have been sentenced (for example, security classification in prison, early release, parole conditions, and intensity of supervision). An offender's sentence cannot be unjustly extended for a prolonged period of time as a preventative measure to address reoffending concerns or to protect public safety without undue cause of concern. That is, an offender's sentence cannot be unfairly restrictive or disproportionate to the crime that he/she has committed. To do so would raise human rights concerns as his/her liberty would be restricted due to an inaccurate assessment of their possible future behaviour or recidivism risk (Glazebrook, 2010). The exception to this is a court sentence or other statutory authority that permits an extended sentence, for example, a lengthy non-parole or probation period for serious chronic recidivists. Due to this, it is important that the risk assessments are administered by trained professionals, as well as ensuring that the chosen instrument has been empirically validated in the population that the assessment is intended to be used in. An example of an extended sentence may include, for example, post-sentence preventive detention, such as the *Dangerous Prisoners (Sexual Offenders) Act (DPSOA)* that was introduced in Queensland in 2003. This legislation provides for the preventive detention or ongoing supervision of dangerous sexual offenders at the expiration of their sentence. However, Douglas (2008) argues that that there may be procedural issues with the DPSOA, such as clarity regarding how prisoners are selected for a preventive detention order, the fallibility of risk assessments, and the argument that preventive detention is rehabilitative given the strain upon, and insufficiency of, available therapeutic resources. As a result, when making recommendations regarding an offenders' sentence, it is important for professionals to be mindful of the court's need to balance the offenders' rights with the rights of society (including current and potential victims) when deciding to impose sentences or conditions based on recidivism risk (Yang et al., 2010).

The theory of Psychology of Criminal Conduct (PCC), which encompasses the GPCSL model, is one of the most prominent theories that aims to address risk of recidivism (Andrews, Bonta, & Hoge, 1990; Andrews & Bonta, 2010). The primary objective of PCC is to develop a rational and empirical understanding of individual differences and variation in delinquent and criminal behaviour and activity. This is done by understanding human behaviour through an ethical and humane application of systematic methods of investigation, and the development of rational explanatory systems. This information can then be employed in order to assess risk of reoffending and to plan rehabilitation programs that aim to lower an individual's risk of reoffending.

The Risk-Needs-Responsivity (RNR) model is a product of PCC and aims to specify how an offender's criminogenic characteristics should influence the selection and implementation of corrective services, including the level of intensity of supervision for those completing community orders (Andrews et al., 1990; Andrews & Bonta, 2010). These criminogenic characteristics relate to risk (that is; factors that predispose an individual to engage in criminal activities), and need which refers to factors that affect an individual's biopsychosocial functioning and the ability to integrate with accepted societal norms. In order to ensure that the RNR model is used effectively within the criminal justice realm, Taxman and Marlowe (2006) recommend that valid risk and needs assessments are developed, as well as designing and implementing treatment programs, that address the identified risks and needs with which offenders present with.

The three core principles that underlie the RNR model highlight a variety of factors that contribute to the development of delinquent and criminal behaviour that are incorporated in the personality and social learning theory perspective (Poledna et al., 2011). These three principles are risk, need, and responsivity.

Risk principle. The risk principle has two aspects: predicting recidivism and matching treatment services to the level of risk of the offender. Risk factors refer to an individual's characteristics and circumstances that may increase the likelihood of the individual engaging in future criminal behaviour. Risk can be viewed as cumulative, with the higher the score on individual factors, the higher the overall risk profile of the offender and the more likely the chance that the individual will re-engage in criminal behaviour.

Andrews and Bonta (2010) identified two types of factors that relate to reoffending: static and dynamic factors. Static factors are generally historical factors that cannot be changed and are rarely the target of an offender management plan. They include criminal history, age at first offence, and abuse and neglect experienced in childhood. Alternatively, dynamic factors are those factors that can be changed and have been linked to recidivism risk. Examples of dynamic factors include employment, education, and prosocial attitudes (Gonsalves, Scalora, & Huss, 2009). The integration of dynamic factors into the current understanding of risk factors reinforces the view that an individual's risk of reoffending is able to be changed and that dynamic variables can be utilised as treatment goals (Andrews & Bonta, 2010).

The risk principle also asserts that an offender's level of risk should be matched to the level of intervention provided. This means that offenders who are identified as being at high risk of recidivism should receive more intensive treatment interventions, whereas lessintrusive interventions should be available for low-risk offenders. Jones, Brown, and Zamble (2010) argue that identifying an individual's level of risk solely from static factors does not provide any practical benefit in the context of interventions. Rather, dynamic factors must be addressed if a risk assessment and resulting interventions are to be successful.

Needs principle. It can be stated that everyone in society has needs that they require to be fulfilled (such as accommodation or friendship). Criminogenic needs are dynamic risk factors that, when changed, are associated with changes in an individual's recidivism risk (Andrews et al., 1990). Not all needs are criminogenic and the needs principle of the RNR model prioritises those identified criminogenic needs for treatment (Andrews & Bonta, 2010). The needs principle when applied correctly provides that whilst offenders may have a wide range of varying needs, in order to reduce recidivism risk the selected intervention must concentrate on the variables related directly to why they offend.

Strength, or protective, factors are discussed within the context of criminogenic needs and generally refer to the characteristics of individuals and their circumstances that can be linked with reduced rates of engaging in criminal activities (Andrews & Bonta, 2010). Strength factors and criminogenic needs have been described as operating on opposite ends of the same continuum (Mooney, 2010). For example, negative attitudes towards crime may be considered a strength if they are associated with low rates of crime engagement, in comparison to positive or neutral attitudes towards crime. Strength factors are also considered to be resilient factors as they operate to protect against the effects of risk factors. However, this tends to be perceived as a weak argument due to the difficulty of empirically validating whether risk factors can actually be affected by strength level (Andrews & Bonta, 2010).

Responsivity principle. The responsivity principle informs agencies on how to treat or address identified risk/need factors. General responsivity indicates that cognitive-behavioural techniques are effective in influencing change as these techniques enable people to learn new attitudes and behaviours. Specific responsivity requires adapting the general cognitive-behavioural techniques to specific offender characteristics. These specific offender characteristics may include factors such as biological (gender), social (culture), and psychological factors, such as personality, emotions, and cognitive ability (Andrews & Bonta, 2010). Interventions can maximise an offender's ability to benefit from an intervention to reduce recidivism risk by providing cognitive behavioural treatment and support whilst matching the intervention to an offender's learning style, what motivates the offender to change, and his/her abilities and strengths.

There had been an ongoing debate as to whether it is possible to accurately predict recidivism risk as well as whether targeted programs, both within and outside the prison setting, can effectively reduce recidivism rates. For example, Martinson’s (1974) review of numerous interventions suggested that such targeted programs have little impact upon deterring individuals from reoffending. Further, Martinson argued that by framing crime as a disease which can be cured ignores, and even denies, the normality of crime both within society and within a large proportion of offenders who respond to the conditions of society by choosing to engage in crime. Whilst Martinson later retracted his claims (for example, Lipton, Martinson, & Wilks, 1975), it stimulated discussion and scientific research into the assessment of recidivism and the implementation and effectiveness of rehabilitation programs that not just included education and vocational training, but extended to many other forms such as counselling, therapy, medical treatment, community corrections and factors such security and length of an inmate’s sentence (Pratt, Gau, & Franklin, 2010). As a result, recidivism can be both assessed and reduced.

In recent years there has been an increase in research interest in identifying risk factors and understanding the association between these factors and future engagement in criminal activities. By doing so, correctional agencies would be better able to identify individuals who are at a higher risk of recidivism and by providing interventions that specifically target these risk factors (Gonsalves et al., 2009). The responsivity principle considers factors that may impinge on an individual’s response to treatment programs. This includes tailoring for factors that are internal to the individual, including cognitive ability and learning style. There is also the need to consider the effect of factors that are external to the individual, such as therapeutic relationships and program content (Ogloff & Davis, 2004).

It is imperative that interventions are targeted and engaged in by offenders who are classified by their risk level appropriately. Interventions that incorporate the framework of the RNR model have been determined to be effective in reducing recidivism in individuals who have been identified as being at a higher risk of reoffending in comparison to lower risk offenders (Andrews et al., 1990; Andrews & Dowden, 2006; Yang et al., 2010). Palmer, McGuire, Hatcher, Hounsome, Bilby, and Hollin (2008) demonstrated that when offenders are targeted correctly using the RNR principles and allocated to relevant cognitive skills interventions, then there is a reduction in recidivism for both medium and high risk offenders. The finding from Palmer et al. corresponds with the risk principle which holds that interventions will show a greater effect with medium- to high-risk offenders, whereas it would be difficult to achieve a large reduction in recidivism for low-risk offenders because they have a lower likelihood of recidivism prior to intervention.

Lowenkamp et al.'s (2006) research identified that intensive programs that recruited a large proportion of low-risk/low-needs offenders resulted in poor outcomes, including an increased recidivism risk, compared to high-risk/high-needs offenders that completed the same or similar intensive interventions. However, even offenders who are higher risk must be provided with more and continued services in order to have a positive impact in reducing recidivism. Similar findings have also been identified by Andrews and Dowden (1999) and Hanley (2002). Lowenkamp et al. (2006), suggest that this effect may occur due to a variety of reasons including that placing lower-risk offenders with higher-risk offenders creates an environment where antisocial behaviour is reinforced and modelled and new peer associations are developed between lower-risk and higher-risk offenders. This results in attitudes and peers supportive of criminal behaviour, which can increase the likelihood of re-engaging in criminal behaviour. Further, such intensive treatment programs may disrupt prosocial networks, such as work or education commitments, and increased supervision combined with rigid conditions (for example, frequent drug testing) may actually act to increase the risk that criminal violations may occur. Andrews et al. (2011) also argue that interventions that fail to address criminogenic needs may increase recidivism risk. Research regarding recidivism outcomes by Severson, Veeh, Bruns, and Lee (2012) assert that corrections personnel may need to reconsider the commonly held belief that any intervention is better than no intervention at all. Rather a targeted and individual approach aimed at addressing the offenders' risk, need, and responsivity factors can aim to reduce recidivism risk, as well as reducing the cost and resources for criminal justice agencies.

Empirical support for the RNR model exists. Firstly, when all three principles are adhered to in corrections, the mean effect size using Pearson's *r* was .26 in 60 tests of treatment, indicating a small to medium effect size. Effect size in this instance reflects the magnitude by which recidivism was reduced. When only two of the three principles are adhered to, the Pearson's *r* drops to .18 in 84 tests, indicating a small effect size. Further, it appears that non-adherence with the RNR principles may actually increase crime and recidivism, with a Pearson's *r* of -0.02 being obtained. Figure 1 depicts the effect size when none of the RNR principles are adhered to through to when all of the RNR principles are adhered to (Andrews, Dowden, & Gendreau, 1999; Andrews & Bonta, 2010).

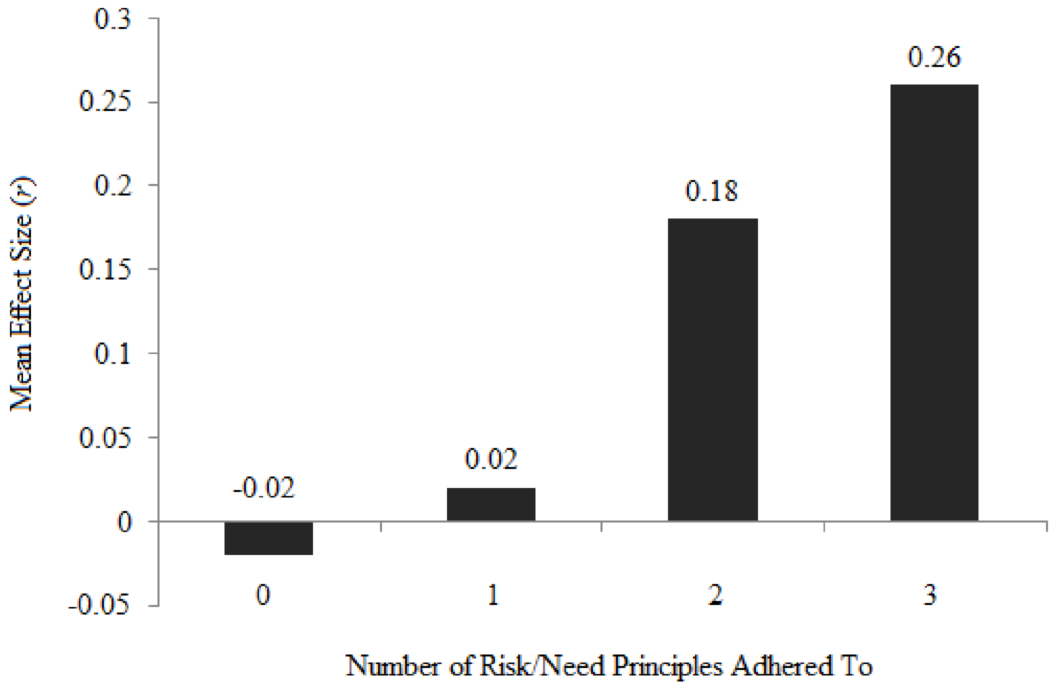

Figure 1. Mean effect size (*r*) by adherence to the number of RNR principles.
*Adapted from Andrews and Bonta (2010, p. 74).

Risk Assessments and Predicting Recidivism Risk

As crime statistics have identified that a large proportion of crime, especially violent crime, is committed by the most persistent reoffenders (Yang et al., 2010), it can be beneficial to develop a method of identifying these offenders in order to engage in appropriate case management with the aim of reducing recidivism risk. In order to develop an instrument and to assess the level of risk of an individual's engagement in future criminal behaviours, it is important to understand the factors that a person has experienced or are currently impacting upon the individual that may influence the likelihood of future criminal behaviour (Andrews & Bonta, 2010). This concern with risk of reoffending has led to a demand for accurate, reliable, empirically valid risk assessment tools to be developed and effectively utilised within the criminal justice domain. With such information, correctional agencies can identify the critical factors associated with re-engagement in criminal behaviour.

The rate of future reoffending could be reduced or prevented by using this information to match the targeted interventions with the identified criminogenic need (Mooney, 2010).

With this in mind, it is important to understand the generational process and change that risk assessments have been subjected to in order to improve reliability and capture the full picture of all the factors that influence an individual’s likelihood of becoming involved in crime. Historically, unstructured clinical or professional judgments regarding an individual’s risk of recidivism were regarded as the norm. These are generally referred to as the first generation of risk assessment instruments (Andrews & Bonta, 2010). In this instance, a professional would base the assessment of risk on an examination of the background/historical information recorded about the individual, usually including an interview with the individual and possibly family members and other professionals who have had contact with the individual. According to Meehl (1954), who conducted a review of clinical and statistical predictions of risk, the clinical prediction was based on hypotheses formulated by the professional regarding the structure and dynamics of the individual in question. Meehl’s research indicated that this subjective feeling/hypothesis was not an accurate method in regard to predicting future behaviour.

Unstructured clinical judgments, or first generation risk assessments, had the benefit of allowing a personal, comprehensive assessment/interview with the individual in question. However, there were no baseline measurements or standard protocols to guide the clinician as to what information was pertinent when predicting whether the individual will reoffend. Because of this there was the potential for biases and judgment errors that affected the decision-making process. As a result, these forms of risk assessments suffered from inconsistency and inaccuracy (Hsu, Caputi, & Byrne, 2009). Due to these reasons, it is now accepted that evaluations based on unstructured professional judgments are significantly less accurate than structured risk assessments, and this pattern has been documented for at least

50 years (Meehl, 1954; Andrews & Bonta, 2010). Meta-analyses examining the efficacy of unstructured clinical judgments in predicting reoffending have demonstrated that, averaged across six first generation mean estimates, the overall mean *r* was .12 indicating a weak relationship in predicting risk of recidivism (Andrews, Bonta, & Wormith, 2006).

Grove, Zald, Lebow, Snitz, and Nelson (2000) examined the accuracy of clinical judgement and mechanical prediction techniques, including statistical and actuarial prediction, by conducting a meta-analysis on 136 studies of health and human behaviour. Their results indicated that on average, the mechanical-prediction techniques (scoring items and using equations and algorithmic prediction to inform levels of risk) were about 10% more accurate than clinical predictions, with clinical predictions performing less well when the predictors of risk included interview data. The mechanical-prediction technique was consistently superior across date and source of the publication, type of judge (medical or psychological), general or task-relevant experience, type of data (for example, interview results, psychological tests, trait ratings, behavioural observations, clinical record), and amount of data available. Further, depending on the specific analyses, mechanical prediction outperformed clinical predictions in 33% to 47% of the studies examined. Whilst this is an improvement compared to clinical predictions, it also indicates that the mechanical-prediction method was a superior method less than 50% of the time, which reflects a no more than chance level.

Ægisdóttir et al. (2006) examined the effect sizes of 67 studies that examined clinical predictions with those using statistical approaches, that is; entering data into a formula that is designed for a particular judgment task. Violence prediction, along with other criminal outcomes, obtained the greatest superiority for statistical prediction (mean effect = .17). This effect size indicates that out of 1,000 predictions, statistical procedures accurately identify 90 more violent clients than do clinical predictions. Whilst the overall advantage of actuarial methods is small (most conservatively, mean effect = .12), this is an important difference in the prediction of recidivism risk, especially in the instance of violent offenders.

Despite these findings that demonstrate the superiority of using empirically validated assessments, clinicians have not readily adopted these models (Hilton, Harris, & Rice, 2006). Palk, Freeman, and Davey (2008) completed a survey on twenty-two registered forensic psychologists in Australia regarding the risk assessment tools that they use, as well as the extent to which these forensic psychologists use clinical information to adjust the level of risk identified through the actuarial approach. Their results indicate that the majority of psychologists surveyed (81.8%) believed that the actuarial assessment approach was reliable. In contrast, 40.9% believed that clinical assessment was unreliable, 31.8% were unsure, and 18.2% believed that clinical assessment was reliable. However, a substantial proportion of these psychologists did not use specific risk instruments to assess recidivism risk among offenders (ranging from 27.3% - 54.5% depending on the identified risk instrument). Half of the surveyed forensic psychologists believed that clinical judgements could sometimes contribute to the risk assessment, and 27.3% of participants believed that clinical judgements contributed “a little” to actuarial risk assessment, with a small proportion (13.6%) indicating that they believed the contribution was “often or all the time”. Palk et al. indicate that it is difficult to understand what factors affected the forensic psychologist’s use of actuarial risk assessments given their demonstrated efficacy in predicting recidivism risk and that this should be an area for further study. In relation to adjusting the level of risk identified by the risk assessment, 59.1% of participants indicated that they did not amend the risk level, whilst 9.1% indicated that they always amended their actuarial risk assessment score after taking into account clinical judgement. Whilst the sample size in Palk et al.’s study was relatively small, it does offer preliminary information on how assessments are being utilised. However, it is argued by Murray and Thomson (2010), that statistically significant improvements on actuarial scales when attempting to predict violence, in comparison to clinical judgement of dangerousness, do not measure the skill of the clinician. Further, whilst statistical measures attempt to predict risk, clinicians are not predictive of risk but have a role in and are trained to manage identified risk.

Second generation risk assessments were developed as a result of Meehl’s (1954) research, where it was argued that most, if not all, clinical observations are able to be encoded and quantified in a structured and uniform manner. This gave way to what is known as actuarial, static risk scales as they were mostly comprised of static, historical factors such as criminal history. These scales were developed and widely used in the United States during the 1970s, with Canada and the United Kingdom adopting similar scales during this time (Hanson & Morton-Bourgon, 2009). Actuarial risk assessment instruments were developed through researching specific offender samples. From these samples, mathematical computations are conducted to best predict violence risk and obtain a specific risk determination. That is; the algorithms used identify a set of rules, or factors that can be utilised to identify specific variables that can inform an offenders’ recidivism risk (Storey, Gibas, Reeves, & Hart, 2011).

The main preference for second generation risk assessments was because of the simplicity of its approach which included summating items. Also, the criminology community now had access to instruments that were evidence-based as the assessments had been validated in specific offender populations. However, actuarial risk assessments often lacked a theoretical basis and often consisted of only historical, static items (Andrews & Bonta, 2010). Even though the research now acknowledges the inherent weaknesses in solely using second generation instruments to reach decisions regarding an offender’s recidivism risk, they did have practical advantages as outlined by Mooney (2010). These include providing a systematic method of discriminating between different risk level categories;

offering a measure in which consistent decision making, standardisation and information is acquired; the assessment can act as a screening tool to identify when further investigation is needed (or example, for medium to very high risk levels); and to assist the clinician in organising information during a complex assessment in which multiple domains of risk/need are required to be assessed.

Second-generation risk assessment instruments were a step forward in building a foundation of instruments that were empirically based and an objective measure of determining offender risk (Kelly & Welsh, 2008). A review of risk/need assessments conducted by Andrews et al. (2006) demonstrated that the predictive validity of second generation instruments was dramatically higher than their first generation counterparts, with the mean predictive validity determined to be r=.42 for general recidivism and r=.39 for violent recidivism. Whilst it is widely regarded that second generation measures have higher levels of accuracy and reliability compared to first generation methods (Hanson & Morton-Bourgon, 2009), second generation instruments did have their pitfalls. Mainly, the majority of second generation assessments had a limited theoretical basis and they predominantly focused on static, historical items which provided limited information as to an individual's future behaviour. Due to this, second-generation risk assessments offered minimal information to the practitioner or supervising staff regarding future reoffending risk as well as implementing strategies to reduce an offender's risk of recidivism.

Third-generation risk assessments were developed as a result of blending both first and second generation methodologies. This generation of risk assessment tools introduced the notion of surveying and measuring the major criminogenic needs, or dynamic risk factors, in order to develop a more detailed and accurate prediction of whether an individual will reoffend in the future (Andrews & Bonta, 2010). Key critical static factors that have been determined to be linked to recidivism are also incorporated into the instruments. In application of the RNR model, assessments of risk/need variables enable the identification of the best candidates for higher levels of supervision (high risk of reoffending), candidates suitable for correctional treatment programs (moderate to high risk cases) as well as the targets of change that are identified by dynamic risk factors and/or criminogenic needs (Andrews & Dowden, 2006).

Second-generation risk assessments were often criticised as they were limited in their ability (and scope) to detect changes in the offender and the circumstances that could increase, or decrease, the offenders' risk of recidivism. The third generation instruments attempted to address and build upon the limitations of second generation instruments by balancing the need-to-know static factors of the offender (for example, age at first offence and number of crimes committed), with dynamic factors. Dynamic factors are criminogenic needs that can be changed, for example through targeted intervention, and when changed can lead to variations in an offenders' recidivism risk (Hsu et al., 2009). The Level of Service Inventory-Revised, or LSI-R (Andrews & Bonta, 1995), is a theoretical based risk/need third generation instrument developed from the RNR model, and has been validated with hundreds of thousands offenders throughout North America, Europe and Asia (Andrews, 1982; Andrews, Bonta, & Wormith, 2004; Chenane, Brennan, Steiner, & Ellison, 2015). The LSI-R remains widely used in corrective services throughout the world including Canada (where it was originally developed), the United States and Australia, as well as other countries that have based their own instruments on the LSI-R to suit their own language and cultural needs. The main benefit of the LSI-R is the identification of higher-risk offenders for whom supervision and services can then be tailored in order to reduce future offending (Andrews & Bonta, 2010).

Gendreau, Little, and Goggin (1996) state that there has previously been controversy, reluctance, or even a lack of interest in assessing dynamic risk factors (or criminogenic needs). There have been various reasons for this including ideological concerns and the importance of individual factors or differences (including offender needs, abilities, attitudes, personality style, and level of intelligence among others) that can change over time, and as a result involves some degree of subjectivity when trying to measure changes in these factors. In addition some methodologists have attempted to argue that dynamic risk factors are unreliable when assessing recidivism risk (Andrews & Wormith, 1989). However, Gendreau et al.'s findings when investigating predictors of recidivism for adult offenders indicate that dynamic predictor domains perform as well as static domains, with criminogenic needs producing higher correlations with recidivism more often than did several other predictor domains. This suggests that dynamic risk factors are a crucial element when attempting to measure an offender's risk of reoffending. The exception to this is sexual offenders in which there appear to be a number of predictors that solely focus on the offence itself (static factors) that are needed to reliably measure recidivism risk and that are unique to this complex class of offenders (Hanson & Bussière, 1998).

The next step in the generation development of risk assessments is that of fourth-generation instruments. Whereas third generation instruments assisted organisations in allocating supervision resources appropriately (risk principle) and providing targeted rehabilitation interventions (need principle), fourth generation instruments emphasise the link between assessment and case management in terms of helping to identify what interventions/programs would help reduce recidivism risk in differing offenders (responsivity principle). They also acknowledge the role of personal strengths in building a prosocial orientation to try to counteract criminal attitudes and beliefs in order to divert offenders from, and reduce the risk of reoffending (Andrews & Bonta, 2010).

Fourth-generation risk assessment instruments are designed in order to guide supervision and intervention services/programs from intake through to case closure (either at the end of the sentence, parole, or community service order). Andrews et al. (2006) acknowledge that one of the major goals of the development of fourth generation instruments was to strengthen adherence to the principles of effective treatment and to guide clinical supervision. As well as reducing the rate of reoffending, this goal also aims to protect the public from recidivistic crime and the impact that this may have upon society.

The Level of Service/Case Management Inventory (LS/CMI; Andrews et al., 2004) is a fourth generation instrument that has been adopted and used in various jurisdictions for criminal justice purposes since its development in Canada. The LS/CMI is comprised of 11 sections, plus it allows for the accommodation of supplementary information. The LS/CMI consists of 43 items which are grouped into eight general risk/need subscales. These subscales reflect the central eight risk/need factors that have been revealed by research findings and have been discussed previously. These subscales include: Criminal History, Education/Employment, Family/Marital, Leisure/ Recreation, Companions, Alcohol/Drug Problem, Procriminal Attitude and Orientation, and Antisocial Pattern. Individuals can be scored on concrete qualitative guidelines for each subscale (very low, low, medium, high, and very high). Strength notations are also available for each of the eight risk/need areas to help identify protective factors for offenders which may enhance the instrument's predictive accuracy.

Building onto the LSI-R, Andrews et al. (2004) added an antisocial personality pattern subcomponent, as well as specific items addressing violence. This helps to provide indicators of psychopathy, anger problems, early and diverse antisocial behaviour, criminal attitudes, and generalised trouble across multiple areas. Combined with other subscale scores, the LS/CMI has been found to be relatively accurate in predicting both general and violent recidivism (Andrews & Bonta, 2010; Girard & Wormith, 2004).

Section two of the LS/CMI reflects consultations that were conducted during the development of this instrument, Youth Level of Service/Case Management Inventory (YLS/CMI; Hoge & Andrews, 2002) experience, as well as developments in research findings (Bonta et al., 1998; Hanson & Bussière, 1998). This section is comprised of two specific risk/need subscales: Personal Problems with Criminogenic Potential, and History of Perpetration. Section two of the LS/CMI attempts to assess aspects of the offender and his/her situation that may have criminogenic potential for that particular offender. Section five allows for responsivity consideration that may influence how a case manager will relate to the offender and supervise the offenders' case. This results in the LS/CMI incorporating all three aspects of the RNR model (Andrews & Bonta, 2010).

The Level of Service inventories incorporate a professional override option. This option allows the assessor to override the numerically derived risk level with their professional judgement. This practice more often increases an offender's risk level rather than reduces it. However, research indicates that this professional override option can affect the predictive utility of the scale. Vaswani and Merone's (2013) research on the YLS/CMI, which assesses recidivism risk in 12 to 17 year olds, indicated that in the majority of cases the professional judgment of the assessment and the result obtained by the YLS/CMI were in agreement. However, in about 14% of the cases, the assessor used the professional override option to acknowledge circumstances of the offence or the young person to adjust the actuarial score (for example, increasing an offender's score from low-risk to medium-risk). The use of the override option was determined to substantially reduce the accuracy of the YLS/CMI to predict general recidivism. For predicting violent recidivism when the professional override option was used, the accuracy of the YLS/CMI was little better than chance. Wormith, Hogg, and Guzzo (2012) also examined the professional override option of the LS/CMI in a sample of sexual offenders extracted from a large cohort of offenders, and compared the predictive utility of the LS/CMI with nonsexual offenders from the same cohort. The study revealed that when assessors utilised the professional override option the predictive validity of the scale was reduced, especially when the risk level for sex offenders was increased excessively.

In relation to the Level of Service scales, Olver, Stockdale, and Wormith (2014) conducted a comprehensive meta-analysis of the predictive accuracy of the Level of Service (LS) scale variants, including the LS/CMI. This included examining thirty years of published research, totalling 128 studies, which comprised of 151 independent samples and a total of 137,931 offenders. Their results indicated that the LS total scores significantly predicted general community recidivism with moderate accuracy (r_w = .30 and .29 for fixed- and random-effects models respectively), and were predictive of more specific community recidivism outcomes such as violence (r_w = .25 for both fixed- and random-effects models). The LS tools were also determined to predict institutional recidivism for both any misconduct and serious misconduct. Although Olver et al.'s results indicated that gender and ethnicity were not substantial sources of effect size variability, significant differences in effect size magnitude were found when analyses were conducted by geographic region. The largest effect sizes were obtained in the Canadian samples (*r* = .38 for general recidivism and *r* = .26 for violent recidivism), followed by studies conducted outside North America (*r* = .30 for general recidivism and *r* = .20 for violent recidivism), and the smallest effect sizes were obtained in samples from the United States (*r* = .20 for general recidivism and *r* = .12 for violent recidivism). As the predictive validity coefficients depend upon the precision of the assessment and outcome measures, Olver et al. suggested that variation in data collection, analyses, assessment training and quality of assurance measures could have an effect on the data collected and more detailed data collection is required to determine whether there are systematic sources of error in the assessment protocol by country. Further, as the Level of

Service scales were developed in Canada, there could be important cultural differences that account for regional discrepancies observed in the predictive accuracy. However, Olver et al. do not consider this to be a primary source of the effect size differences as the central eight domains are found across cultures (Andrews & Bonta, 2010). However, the effect size difference may be attributed to familiarity to the risk assessment instrument for Canadian users. In contrast many of the US studies were prospective examinations of the scale, rated by parole and probation officers who have huge caseloads and may have reduced rater accuracy, and therefore may not have been as familiar with the assessments as the Canadian users.

Gendreau, Goggin, and Smith (2002) examined the predictive utility of the Psychopathy Checklist Revised (PCL-R; Hare, 2003) and the LSI-R. Their results indicated that the LS tool predicted general recidivism better than the PCL-R ($r = .37$ vs. .23), and modestly predicted violent recidivism better than the PCL-R ($r = .26$ vs. .21). Yang et al. (2010) used multilevel modelling procedures to compare various common forensic assessment instruments in the prediction of violence, such as the Psychopathy Checklist (PCL-R; Hare, Harpur, Hakstian, Forth, Hart, & Newman, 1990), Violence Risk Assessment Scheme (HCR-20; Webster, Douglas, Eaves, & Hart, 1997), Violence Risk Appraisal Guide (VRAG; Quinsey, Harris, Rice, & Cormier, 1998), and the LSI/LSI-R. Yang et al. found that for all of the instruments included in the study, their total scores and their subscales predicted violence at about the same moderate level of predictive efficacy with the exception of the PCL-R, which predicted violence at a chance level in men. In contrast to these findings, Singh, Grann, and Fazel (2011) undertook a systematic review and meta-analysis of nine risk assessments, including the LS measures. They collected data from 68 studies based on 25,980 participants. They determined the LS measures to have the weakest predictive accuracy for violence, along with the PCL-R, relative to other forensic assessment tools. Further, all the instruments examined produced higher predictive validity rates in older and predominantly white offender samples. Whilst Olver et al. (2014) suggest that this may be due to Singh et al. not conducting within-study comparisons, using multilevel procedures, or obtaining a comprehensive collection of LS studies from the period sampled, it does raise concern about using risk assessments without further assessing their utility in both the population it is intended to be used and a designated outcome (for example, general or violent recidivism).

Empirical Support for the Level of Service/Case Management Inventory

The LS/CMI is the commercially available version of the *Level of Service Inventory – Ontario Revision* (LSI-OR; Girard & Wormith, 2004). It was developed as a case management tool for correctional workers, and it aims to adopt a systematic measure to ensure continuity of care across correctional agencies. In developing the LSI-OR, Girard and Wormith wanted to ensure cross-validation and update relevant items from the LSI-R. This is a recommended process for any assessment measure that aims to predict criminal behaviour due to the evolving nature of laws, legal terms, social impacts, and changes in offender populations.

The LSI-OR has been validated on 630 adult male offenders, consisting of 454 inmates and 176 probationers under community supervision. The results of Girard and Wormith's research (2004) indicated that the internal consistency of the 43 General Risk/Need items was excellent ($\alpha = .91$). The internal consistency was low for the Specific Risk/Need Section ($\alpha = .62$). Alpha coefficients for the subscales in the General/Risk Need section varied from .32 (Family/Marital, indicating poor internal consistency) to .80 (Criminal History, indicating acceptable internal consistency). In regard to reliability, Nunnally (1978) asserts that instruments used in basic research should have a reliability of .70 or better, whereas for instruments used in applied settings a reliability of .80 may not be sufficient. Rather, where important decisions regarding the fate of an individual is made on the basis of test scores, reliability should be at least .90, preferably .95, or above. As can be seen, most of the alpha coefficients obtained fall below this recommended range. In regard to general recidivism, the LSI-OR's predictive capacity for both inmates (R^2 = .37) and the community group (R^2 = .40) was significant. The LSI-OR's predictive capacity was also significant for violent recidivism for both inmates (R^2 = .42) and the community group (R^2 = .25). Receiver Operating Characteristic (ROC) analyses determined that the General Risk/Need section was better able to predict general recidivism (Area under the Curve [AUC] = .73), whilst the Specific Risk/Need section was better able to predict violent recidivism (AUC = .71).

A study completed by Guay (2012) examined the predictive utility of the LS/CMI in a cohort of Quebec gang members. The results demonstrated the LS/CMI was able to identify more significant criminogenic risks and needs in gang members compared to a matched non-gang offender sample. In regard to predictive utility, ROC analyses identified that the LS/CMI was able to predict new arrests (general recidivism) for both gang (AUC = .71) and non-gang (AUC = .73) offenders. However, the quality of the prediction was lower for predicting new arrests for violent crimes for both gang (AUC = .56) and non-gang (AUC = .61) offenders.

Whilst the LS/CMI has been adopted and used in various jurisdictions since its development, there is little readily available information that investigates its validity and psychometric properties. There is also limited research that investigates the factor structure of the Level of Service inventories, including the LS/CMI. The LS/CMI contains certain factors to address the particular needs of a known population. That is, it incorporates known static and dynamic risk/need factors to identify an offender's level of recidivism risk in a Canadian corrections environment. The Level of Service Inventories, including the LS/CMI, have been used extensively across different jurisdictions. It is assumed that the factors underlying these instruments, as well as its efficacy in regard to predictive utility, will be transferable across different criminal jurisdictions, as well as being applicable to different offender groups (for example, women and Indigenous offenders). However, the level of empirical support for these assumptions remains unclear, and further analyses of the use of such instruments in differing populations is both warranted and encouraged (Hsu, 2010; Schlager & Simourd, 2007).

Due to the limited available research investigating the empirical validity and the factor structure of the LS/CMI, it is useful to refer to its predecessor, the LSI-R, upon which the LS/CMI is based. Various studies have investigated the LSI-R and how its subscales can be arranged into fewer factors. Studies have identified a three-factor solution in Canadian probationers (Andrews & Robinson, 1984), and in Colorado probationers (Arens, Durham, O'Keefe, Klebe, & Olene, 1996). Another study by Loza and Simourd (1994) determined that a two-factor solution identified in Colorado inmates was comparable with Canadian federal male inmates. A study conducted by Hollin, Palmer, and Clark (2003) examined the factor structure of the LSI-R in a sample of English male offenders. Their results indicated a two-factor solution with the first factor accounting for 41% of the variance. However, the Finance subscale did not load on either of the two factors. Palmer and Hollin's (2007) research with English female offenders produced a one-factor solution that accounted for 38.8% of the explained variance. When a two-factor solution was forced, only the Emotional/Personal subscale loaded on the second factor. The Attitude/Orientation subscale did not load on either of the two factors. An Australian study by Hsu, Caputi, and Byrne (2011) examined the LSI-R at an item level which produced a five-factor solution for male offenders, and a four-factor solution for female offenders which were comparable. The fifth factor for males had two items addressing acquaintances and friends not involved in criminal activity which could act as protective factors in regard to future offending. Andrews and Bonta (1995) have noted that studies have not revealed a consistent factor structure for the LSI-R and suggest that the LSI-

R's factor structure may depend upon the population and setting in which it is administered. As these studies demonstrate, fluctuations between jurisdictions may occur requiring the instrument to be calibrated to the specific population. It is reasonable to assume that this line of argument could also apply to the LS/CMI.

The variations in how the subscales load onto common factors may be the result of the heterogeneous nature of the offender population, as well as jurisdictional differences (Maurutto & Hannah-Moffat, 2007). Further, the analytical approaches may also influence each of the factor solutions; for example, principal components analysis (groups common variances) in comparison to factor analysis, which identifies latent dimensions or constructs (Child, 1990; Costello & Osborne, 2005). Due to the lack of research regarding the factor structure of the LS/CMI, combined with varied factor structures on the LSI-R, it is appropriate to explore the factor structure of the LS/CMI at the item level to determine whether the previously identified factor structures are supported in different offender populations. Understanding the factor structure of an assessment within a target population is important as a factor analysis identifies groups or clusters of items (otherwise known as variables) on an assessment. These clusters of items suggest that they could be measuring the same underlying dimensions, or factors, and are related to each other (Field, 2005). Identifying a differing factor structure on an assessment may indicate that, in this instance, the target population has differing risks or needs than the original population sample, requiring the instrument to be recalibrated in the target population. Doing so, could result in an increase in accuracy in identifying recidivism risk and predicting reoffending.

Australian Studies of the Level of Service Inventories

Research is available in which the LSI-R has been empirically examined within an Australian context. The results from the following Australian studies indicate that risk assessments developed internationally need to be validated and/or adapted in order to improve their predictive utility within an Australian context. That is, risk assessments are not generally transferable across jurisdictions and therefore should be evaluated.

For example, Hsu's research (2010) determined that there were gender variations on subscales of the LSI-R and that Indigenous offenders' scores were consistently higher than the scores of non-Indigenous offenders. This may also equate to a higher recidivism rate, with 29.7% of Indigenous male offenders reoffending compared to 18.1% of non-Indigenous male offenders, and 25.6% of Indigenous female offenders reoffending compared to 14.4% of non-Indigenous female offenders. Mihailides, Jude, and Bossche (2005) questioned the appropriateness of using Canadian norms to identify Australian offenders' level of risk of recidivism due to Australian offenders scoring higher across LSI-R subscales compared to Canadian offenders.

Further research by Hsu (2010; Hsu et al., 2009; Hsu, Caputi, & Byrne, 2010; Hsu et al., 2011) indicates that whilst male and female offenders do not differ on the LSI-R total score, LSI-R subscale differences were apparent, suggesting differing criminogenic need characteristics. Further, whilst the predictive validity of the LSI-R for Australian male offenders was similar to other international male offenders, the LSI-R was unable to identify specific need characteristics distinguishing between female recidivists and non-recidivists. Hsu suggested that this finding centred on the lack of specificity and potential irrelevancy of the underlying constructs of the LSI-R for Australian female offenders. This is particularly important as the LSI-R was developed and normed on Canadian Caucasian male probationers and may not apply to Australian offenders. Research conducted by Mihailides et al. (2005) identified that Australian offenders scored higher across the LSI-R subscales than their Canadian counterparts, and that these differences were more apparent for Australian female offenders. From this, it can be argued that it is appropriate to conduct vigorous research on instruments that have been developed outside Australia, before unquestioningly adopting them to guide criminal justice decisions regarding the perceived recidivism risk of an Australian offender.

Watkins (2011) statistically evaluated the LSI-R's psychometric properties within a sample of New South Wales custody-based offenders. For this research, recidivism was defined as reincarceration following release, which may have limited the results obtained (for example, not taking into account any reconviction). Watkins' results indicated that in terms of discriminative ability, the LSI-R was performing similarly to its use internationally. In terms of AUC values, the highest was obtained for non-Indigenous males (AUC = .69, 95% CI [.68, .71]), closely followed by non-Indigenous females (AUC = .69, 95% CI [.64, .73]). From analyses of survival time, there was evidence that offenders classified as being high risk do reoffend at higher rates and at a faster rate than offenders classified as being of lower risk. According to Watkins, in terms of the LSI-R's internal consistency, Cronbach's alpha coefficients ranged from low (α = .51 for the accommodation subscale) to acceptable (α = .78 for the Education/Employment subscale).

Ringland (2011a) examined the predictive utility of the LSI-R subscale scores in a model of recidivism using data obtained from Corrective Services New South Wales. The results indicated that after controlling for standard risk factors, several subscales were significantly associated with reoffending. For both male and female offenders, the education/employment and attitudes/orientation LSI-R subscales were associated with reoffending. The criminal history, alcohol/drugs and accommodation subscales were associated with reoffending in males, whilst the companions subscale was associated with reoffending in females. No other subscales were significantly associated with reoffending, however the differences indicate that there are gender variations in the subscales associated with recidivism. In terms of predictive utility, the rate of reoffending within a 12-month period increased with increasing risk level, with the odds of reoffending being higher for those classified as being of medium risk (4.0 for males, 4.6 for females) than the odds of those at low risk, and the reoffending odds for those classified as being at high risk were higher (12.8 for males, 10.7 for female) than those classified as being at low risk. Therefore, offenders who are categorised as being of higher risk are more likely to reoffend than offenders categorised as lower risk. Ringland suggests that the inclusion of the LSI-R subscale scores in models of recidivism (as opposed to only including the LSI-R total score) could help improve the predictive utility of models of recidivism for evaluation.

Gender and Indigenous Neutrality of Risk Assessment

There have previously been very few systematic empirical studies that investigate whether gender differences exist in regard to risk factors and predicting reoffending. A gender-neutral approach is grounded in the GPCSL approach of understanding criminality and draws upon the central eight risk and need factors and their link/interaction upon criminal behaviour (Andrews & Bonta, 2010). However, feminist scholars (see, for example, Daigle, Cullen, & Wright, 2007) have challenged this gender-neutral approach by arguing that the pathways of females into the criminal justice system differ from those of men. More specifically, they argue that the GPCSL approach ignores power imbalances in society’s structure and the differing socialisation and experiences of males and females. This, in turn, affects the rate of occurrence of criminal behaviour including the impact of such factors as victimisation, parenting and family commitments, economic difficulties, and substance abuse (Reisig, Holtfreter, & Morash, 2006; Rettinger & Andrews, 2010; Smith, Cullen, & Latessa, 2009).

Rettinger and Andrews (2010) examined the predictive performance of multiple variables as identified by the GPCSL model and the central eight risk/need factors to determine if gender differences did exist when examining risk of reoffending. The gender-specific variables that they examined, as proposed from previous research, included emotional distress, minority status, history of abuse, self-abuse, history of suicide, relationship concerns, mental health system involvement, financial problems, single parenthood status, and stress resulting from parenting responsibilities. Their study comprised of 411 women (172 were incarcerated and 239 were under community supervision). The authors used the LSI-R in order to survey the offenders' personal and social history, whilst the LS/CMI was used to measure general risk and need.

The results of Rettinger and Andrews' (2010) study revealed that whilst women self-reported high rates of stressed and distressing circumstances, many of the factors that are argued to be gender-specific had no incremental predictive validity in predicting recidivism risk beyond the central eight factors as identified by the GPCSL model. However, financial problems and a measure of personal misfortune did predict reoffending to some extent among low-risk/low-need women. Personal misfortune was computed through summation of evidence of ever being physically, sexually, or emotionally abused, marital dissatisfaction, being unhappy with accommodation, having few healthy recreation activities, emotional distress, phobias, and sleeping difficulties. The authors suggested that this finding may indicate that antisocial behaviour stems most directly from personal distress when the major supports for crime is minimal. In other words, for a female to engage in crime where other risk factors are minimal, she must be in particularly distressing circumstances and/or a distressed mental state. This study provided evidence that the GPSCL and the RNR model and its associated risk/need instruments were applicable to adult female offenders, and that gender-specific concerns may be best viewed as specific responsivity factors. Therefore, it is argued that gender may be important in terms of what services should be utilised when reducing recidivism risk in female offenders in order to target the major risk factors that have been identified when implementing risk/need assessment measures.

In response to concerns regarding whether gender can affect the accuracy of assessing recidivism risk, Andrews et al. (2011) explored the gender neutrality of three risk/need assessment measures. These included the YLS/CMI, the LS/CMI, and the Level of Service/Risk, Needs and Responsivity (LS/RNR) (Andrews, Bonta, & Wormith, 2009). The LS/RNR is the LS/CMI without the case management protocol. Andrews et al. (2011) conducted a multi-study investigation that explored recidivism with particular attention to risk, gender, and their interaction as three sources of variability in criminal recidivism. Andrews et al.'s findings indicate that the predictive utility of the central eight risk/need domains, as assessed by the three Level of Service instruments, was gender-neutral. That is, if a factor was predictive with female offenders, it was also predictive with male offenders and vice versa. The exception to this was substance abuse. Although substance abuse was predictive for both genders, it was determined to be more strongly associated with the recidivism of female offenders. The authors posit that this needs further validation in larger samples of female offenders and may result in Andrews and Bonta (2010) revising the descriptions of the central eight risk/need factors with reference to the big four factors for male offenders and the big five factors for female offenders.

For Indigenous offenders, there is a concern that most risk assessments have an inherent cultural bias that may negatively and unfairly impact on Indigenous offenders. This is because most standardisation samples consist of non-Indigenous samples (Martel, Brassard, & Jacccoud, 2011). In response to this, Gutierrez et al. (2013) conducted a meta-analysis of 32 reports and 12 data sets (N = 57,315 Indigenous offenders, N = 204,977 non-Indigenous offenders). Their results indicated that all of the central eight risk/need factors were predictive of both general and violent recidivism. Whilst similar, the best predictors of general recidivism for non-Indigenous offenders included criminal history, alcohol/drug, and antisocial pattern. For the prediction of violent recidivism, there were no significant differences between Indigenous and non-Indigenous offenders for the family/marital, alcohol/drug, or antisocial personality pattern subscales. The results for criminal history, employment/education, and pro-criminal attitudes subscales were inconsistent, and the random effects analyses consistently found no significant differences between the groups (and insufficient data to examine the companions and leisure/recreation subscales). Further, Gutierrez et al. determined that the best predictors of general recidivism for Indigenous offenders were criminal history, pro-criminal associates, and antisocial personality pattern. Wilson and Gutierrez (2014) determined that the LSI and its derivatives (e.g., LSI-R, LSI-OR) were predictive of recidivism for Indigenous offenders. However, five of the eight subscales (criminal history, companions, alcohol/drug, procriminal attitude orientation, and antisocial pattern) predicted general recidivism significantly better for non-Indigenous offenders than for Indigenous offenders. They also determined that the Level of Service Inventories tend to under-classify low-scoring Indigenous offenders, with low-scoring Indigenous offenders having higher mean predicted probabilities of recidivism than expected when compared with low-scoring non-Indigenous offenders. Wilson and Gutierrez suggest that the difficulty with discrimination between low- and high-risk Indigenous offenders may be due to calibration (comparing the expected recidivism rate as determined by the LSI with the actual observed rate of recidivism). Other factors may also include racial discrimination within the criminal justice system, Indigenous offenders having a greater number of non-assessed risk factors, the instruments not accounting for the unique experiences of Indigenous people, and a lack of consideration for culturally specific variables.

In regard to Australian studies, Hsu’s (2010) research indicated that there were gender variations on subscales of the LSI-R. Further, differences were highlighted between Indigenous and non-Indigenous offenders, where Indigenous offenders’ scores were consistently higher than non-Indigenous offenders across all subscales. This finding could be attributed to geographical implications for Indigenous offenders living in remote communities, which results in less employment opportunities, as well as housing/living arrangements, and familial/marital needs for Indigenous offenders. Findings from this study also indicated that the LSI-R was able to identify fewer criminogenic need factors for female offenders, especially Indigenous female offenders. This finding could be a reflection of cultural differences between Indigenous and non-Indigenous offender groups and as a result the assessments are not sensitive to teasing out these differences. An alternative consideration is that female offenders, especially Indigenous female offenders, have fewer criminogenic needs to be identified, but would require further research to support this. Despite this, obtaining inadequate and/or limited information regarding criminogenic needs has implications as without this information it is difficult to provide a supervision management plan and/or interventions which successfully reduce the likelihood of recidivism.

Watkins' (2011) research indicated that whilst there were differences on the LSI-R due to sex and Indigenous status, these results were considered inconsequential due to their low explanatory power in regard to the observed variance in total LSI-R scores. Thus, the outcomes of the research suggest that both Indigenous and non-Indigenous offenders scored similarly on the instrument, asserting that gender and ethnic neutrality is confirmed within the sample. However, in terms of discriminative ability, the AUC values obtained for Indigenous males and females (AUC = .655 and AUC = .597 respectively) were lower than those obtained by their non-Indigenous counterparts (AUC = .697 for non-Indigenous males, and AUC = .687 for non-Indigenous females). Watkins suggests that these results may have occurred due to Indigenous females manifesting different criminogenic needs than those captured by the LSI-R.

Lastly, Ringland (2011a) identified gender differences in regard to the LSI-R subscales and their independent association with reoffending in the presence of standard variables such as age, Indigenous status, principal offence type, type and length of penalty, number of convictions in the last five years, and prior drug conviction. For male offenders, the criminal history, education/employment, alcohol/drugs, accommodation, and attitudes/orientation subscales were independently associated with reoffending. For females, the subscales independently associated with reoffending included education/employment, companions, and attitudes/orientation. Further, the AUC values increased predictive accuracy when the selected LSI-R subscale scores were combined with the standard variables (AUC = .729 for males, AUC = .730 for females) in recidivism models, compared with all LSI-R subscales scores (AUC = .687 for males, AUC = .698 for females). Standard risk factors collected from screening tools included age, Indigenous status, number and type of prior convictions, juvenile convictions, types of prior sentences, type of principal offence, and number and type of concurrent offences. Ringland indicated that the performance of the LSI-R in predicting recidivism, while similar to previous Australian studies (e.g., Hsu et al., 2009) can only be considered fair.

Future Research Directions and Rationale for the Research

In the area of criminal justice, risk assessments attempt to increase the understanding of factors relating to criminal behaviours in offenders. An ideal assessment will identify an individual’s specific criminogenic risk/needs, which can then be used to tailor an individualised case management plan, as well as provide an indicative level of risk for engagement in future criminal conduct. As summarised above, the Level of Service tools are the most widely used risk assessment instruments in criminal justice agencies. There have been numerous studies that have examined the efficacy of these instruments in identifying criminogenic risk/needs and accurately predicting an offender’s recidivism risk. However, the results from these findings are mixed. Some studies indicate that these instruments accurately predict general and violent recidivism, and in some instances with greater accuracy than other instruments such as the PCL-R (for example, Olver et al., 2014; Gendreau et al., 2002). However, other research indicates that there are issues with adopting these inventories into differing jurisdictions without first validating the tool in the designated offender population. For example, Singh et al. (2007) found the Level of Service measures to have the weakest predictive accuracy for violence relative to other available forensic assessment tools.

Research regarding the Level of Service tools within Australia is beginning to emerge in the academic domain. Australian criminal jurisdictions are engaging in research to evaluate how accurate such instruments are in identifying criminogenic risk/needs in different offender populations, as well as their predictive efficacy in identifying an offender’s level of recidivism risk in relation to his/her subsequent reoffending behaviours. Australian studies are identifying issues with the LSI-R and the results of the research indicate that further investigation is required into their utility within Australia, specifically with female and Indigenous offenders (see Watkins, 2011; Ringland, 2011a; Hsu, 2010; Mihailides et al., 2005).

Future research regarding the use of risk assessments, especially within Australia, should examine the psychometric properties and their efficacy at identifying offenders’ recidivism risk in the population in which they are intended to be used. Hannah-Moffat (2006; 2009) mentions the need to validate these instruments as research indicates that the normed reference groups for such instruments are not readily generalised to other jurisdictions, especially international populations. Therefore, it is important for the instrument to be examined, and if necessary tailored or adapted to meet the needs of the designated offender population to improve its utility. Ensuring an adequate risk assessment will not only identify offenders of a higher risk of reoffending, but it can also ensure that funds and resources are provided in a targeted manner in order to reduce reoffending. Further, using the information obtained for sentencing and careful case management planning will have the flow on effect of protecting the public from future criminal acts, as well as ensuring the rights and needs of the offender are being addressed.

The majority of the published research available indicates that the Level of Service Inventories, including the LS/CMI, are predictive of recidivism and can adequately identify an offender's criminogenic risk/needs (e.g., Olver et al., 2014; Gendreau et al., 2002). There are also a number of studies that suggest that the LS inventories have a weak predictive validity (Singh et al., 2011), or that there are issues with using these inventories in populations other than white males (Hannah-Moffat, 2006; 2009). Research regarding the LSI-R suggests that caution is required when utilising an internationally-validated risk assessment within an Australian context. Further, such instruments may need to be adapted or calibrated in order to improve their reliability and validity within an Australian context (Hsu, 2010; Mihailides et al., 2005). In relation to the LS/CMI specifically, whilst this instrument has been validated internationally, its use within Australia and more specifically in the Tasmanian correctional environment remains relatively unsubstantiated. At the time of the writing of this thesis, there were no readily available Australian published studies that have examined the LS/CMI's efficacy at predicting recidivism risk in any Australian jurisdiction. Therefore, it can be argued that validating the LS/CMI in a sample of Australian offenders is important to determine if this instrument is applicable to this population, or if an instrument sensitive to Tasmanian offenders' risk/needs is required.

Whilst it may be difficult to compare crime rates between Australian states due to differences in methodology in regard to classifying and recording crime, some crime differences are apparent across Australian states and territories. Specifically relating to Tasmania, Tasmania has the second lowest rate of incarcerated Indigenous offenders, with the Australia Capital Territory having the lowest rate in relation to the size of the Indigenous population, at the end of financial year in 2009 and 2012. Further, between 2002 and 2012 there has been a 3% decrease in incarceration of Indigenous offenders in Tasmania, with the remaining states (with the exception of New South Wales) having an increase in incarceration of Indigenous offenders (Grace, Krom, Maling, Butler, Midford, & Simpson, 2013). The following crime statistics are from the Australian Bureau of Statistics (ABS; 2014). Overall, Tasmanian offender rates are the second highest in Australia (with Northern Territory having the highest), but this offender rate has slowly been decreasing from 2008-09 to 2011-12 as depicted in Figure 2. In the 2011-12 period, Tasmania and the Australian Capital Territory (ACT) reported decreases in the number of male offenders but increases in the number of female offenders, whilst the remaining states reported decreases in both the number of male and female offenders. Tasmania also had the highest proportion of offenders who were proceeded against by police during 2011-2012 (five times more than any other state during the reference period). Finally, public order offences were the most prevalent principal offence for which offenders were proceeded against in 2011-12 in the Northern Territory (1,699 per 100,000), Tasmania (1,077 per 100,000), Queensland (476 per 100,000), and the ACT (269 per 100,000). The most prevalent principal offence for the remaining states included illicit drugs in South Australia, theft in Victoria, and acts intended to cause injury in Western Australia. As can be seen, there are various differences in the Tasmania offender population, compared to other Australian states, which warrants investigation of the validation of the LS/CMI within this offender population.

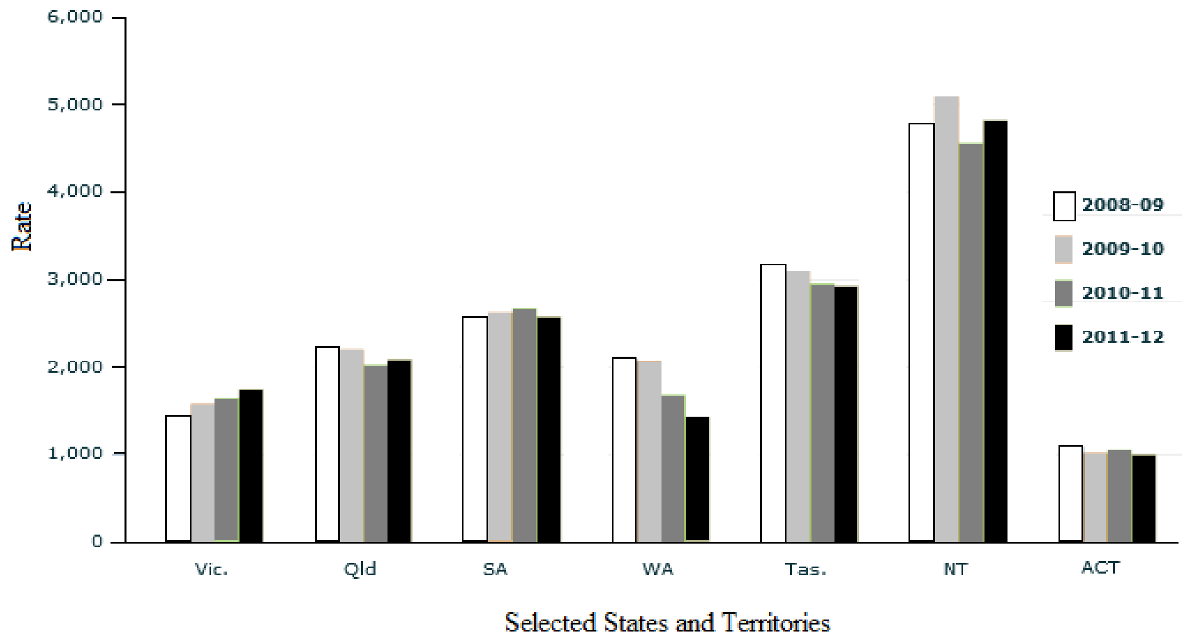

Figure 2. Offender rate for selected states and territories from 2008-09 to 2011-12 (Source: ABS, 2014).

As limited information is available regarding the application of the LS/CMI, it may be appropriate to draw on studies that examine the efficacy of its predecessor, the LSI-R. This is due to the LS/CMI subscales being adapted from and drawing upon the concepts that underpin the LSI-R. From this, the research indicates that there is a need to validate the use of the LS/CMI in an Australian context in order to examine its value and reliability at predicting risk of recidivism and informing the resulting recommendations for providing supervision and targeted interventions for Australian offenders (Ringland, 2011a; Watkins, 2011; Hsu, 2010; Mihailides et al., 2005). Therefore, this study contributes to the existing knowledgebase of risk recidivism within the fields of criminology and forensic psychology.

Research Aims

The aim of this research was to contribute to existing knowledge of risk assessment and risk of recidivism in the following ways. It provides an evaluation of the LS/CMI in an Australian context (more specifically, a Tasmanian jurisdiction). This provides valuable information as to whether the LS/CMI can adequately predict risk of reoffending within a targeted Australian offender population, being Tasmanian offenders. Using the research obtained from the LS/CMI evaluation and extensive literature review of factors relating to predicting reoffending, a risk assessment specifically targeted for a Tasmanian offender population was developed. This risk assessment aimed to identify Tasmanian offenders' specific needs and can, in turn, inform the development of interventions and supervision arrangements within this jurisdiction. It was envisioned that a risk assessment specifically developed and calibrated for this population would be more sensitive towards detecting the risk and needs of Tasmanian offenders with the long-term aim of reducing reoffending in the community. Further, the benefit of this research included an expansion of knowledge concerning adult offenders, specifically within the Tasmanian population, but may also be generalised to the wider Australian justice and corrections populations.

Based on the literature reviewed throughout this chapter, it was proposed that reoffending within a Tasmanian adult offender population could be accurately predicted, and therefore reduced, with the introduction of an evidence-based risk assessment measure that has been specifically adapted for this population. This proposition was supported by achieving the following objectives. One of the objectives of this research was to investigate the predictive and incremental validity of the LS/CMI. It was critical that this validation study was conducted within the environment in which it is used most predominantly, being the Tasmanian Department of Justice and Community Corrections where the LS/CMI is used to form part of the pre-sentence report procedure. A secondary objective was to explore the psychometric properties of the LS/CMI through data obtained from Tasmanian offenders. A third objective of this study included developing and piloting a risk assessment instrument that had been created specifically for this Tasmanian population. An additional objective of this research included addressing the lack of information regarding the validity of using the LS/CMI and risk assessments within an Australian population.

This thesis is comprised of several papers that evaluate the utility and predictive validity, as well as the psychometric properties and factor structure of the LS/CMI for Australian offenders (Chapters 2 and 3). This information was then utilised in order to develop and pilot a revised risk assessment (Australian Risk/Need Inventory [ARNI]) tailored for the Tasmanian offender population. Chapter 4 focuses on the development of the ARNI, and examines its psychometric properties, factor structure, and predictive utility for general recidivism within a six-month time frame. The studies reported in the following chapters include further detailed literature reviews, rationales and hypotheses relevant to the aim of each study.

2

An Evaluation of the Level of Service/Case Management Inventory in an Australian Community Corrections Environment

Heidi Gordon[1], Sally F. Kelty[1] and Roberta Julian[1]

[1]Tasmanian Institute of Law Enforcement Studies (TILES), University of Tasmania, Hobart, Australia

Study 1: An Evaluation of the Level of Service/Case Management Inventory in an Australian Community Corrections Environment[1]

Study Overview

The aim of study one was to investigate the need profiles and the validity of the LS/CMI for Tasmanian offenders serving community-based orders. This study provided normative statistics and specific need profiles for Tasmanian offenders, and investigated the relationship between offenders' LS/CMI total and subscale scores and reoffending. This attempted to provide information as to whether the LS/CMI is accurately predicting recidivism within this population, as well as providing more information on needs, or areas of concern, that are significantly implicated in reoffending.

It was hypothesised that the general criminogenic risk factors (criminal history, age, substance use, education and employment) would be predictive of future reoffending for males. However, for females, it was hypothesised that females may either share similar criminogenic needs to their male counterparts due to the gender neutrality of the Risk-Need-Responsivity model (Andrews et al., 1990). However, it may also be hypothesised that gender differences may be apparent on the LS/CMI subscales, but still be predictive of reoffending (Andrews et al., 2011).

The results of this study indicated that the LS/CMI had a weak discriminative ability for non-Indigenous males. However, it predicted recidivism in non-Indigenous female offenders at an accuracy level no greater than chance. This finding should be interpreted with

[1] This paper was based on a conference presentation, titled "Prediction of recidivism in a Tasmanian population: Evaluation of the Level of Service/Case Management Inventory', which outlined the preliminary findings to this work. The presentation was given at the Australian and New Zealand Association of Psychology, Psychiatry and Law (ANZAPPL) 32nd Annual Congress, November 2012, Melbourne.

caution due to the small female offender sample size. These findings for non-Indigenous offenders are consistent with previous Australian and international research.

This study demonstrated that the LS/CMI, as it is currently used in Community Corrections in Tasmania, had weak predictive validity within this sample. The results highlight the importance of validating risk assessments for specific populations and within the jurisdiction in which it is intended to be used. Therefore, it is imperative that the LS/CMI is validated and/or tailored to meet the needs of Australian offenders. All analyses for this chapter can be located in Appendix A.

The following chapter is presented as a published journal article. The published journal article is accessible from:

Gordon, H., Kelty, S., & Julian, R. (2014). An evaluation of the Level of Service/Case Management Inventory in an Australian Community Corrections Environment. *Psychiatry, Psychology and Law, 22,* 247 - 258. doi: 10.1080/13218719.2014.941090

An Evaluation of the Level of Service/Case Management Inventory in an Australian Community Corrections Environment

Heidi Gordon, Sally F. Kelty, and Roberta Julian

Tasmanian Institute of Law Enforcement Studies (TILES), University of Tasmania, Hobart, Australia

Abstract

Risk assessments are crucial in aiding criminal justice practitioners because they provide a standardised instrument that aims to identify risk factors that may influence whether an individual will reoffend. This helps to tailor an offender's case-management program to ensure offenders are accessing the appropriate services and interventions and to keep the community safe from future reoffending. The aim of the current study was to investigate the validity and predictive utility of the LS/CMI in a sample of Australian offenders. The results indicate that the LS/CMI has a weak discriminative ability for non-Indigenous males. However, it predicts recidivism in non-Indigenous female offenders at an accuracy level no greater than chance. This finding should be interpreted with caution due to the small female offender sample size. These findings for non-Indigenous offenders are consistent with previous Australian and international research. Whilst data from Indigenous offenders were examined, the results should be interpreted with caution due to the small sample sizes. This research highlights the importance of validating risk assessments for specific populations.

KEYWORDS: criminal justice; Level of Service/Case Management Inventory; recidivism; reoffending.

At some stage, most offenders will be released into the community, either while engaging in a community-based order, at the end of a custodial sentence, or on parole. Many of these offenders will go on to reoffend, with up to 41% of Australian prisoners being reimprisoned within a 2-year period upon release, and 15% of adult offenders returning to community corrections within 2 years of completing their orders (Payne, 2008). Most communities expect that their government will develop measures to reduce criminal behaviour, as well as to protect the wider population from the potential harm from criminal behaviours. Therefore, there must be a careful balance between public safety, the individual rights of the offender and government policy (Douglas, Yeomans, & Boer, 2005).

There has been an increase in criminal justice agencies either adopting or developing risk assessments with the aim of attempting to predict an offender's risk of recidivism. The results from such assessments can play a crucial role in pre-sentence reports, where parole is granted, as well as suitability for a community corrections order and supervision arrangements (Maurutto & Hannah-Moffat, 2007). Because of this it is imperative that correctional agencies use risk assessment instruments that have a strong empirical basis and are psychometrically sound. This is to ensure that the risk assessment is measuring what it is supposed to measure - an offender's risk of recidivism - as well as correctly utilising information to help develop case-management guidelines that reduce offending behaviour (Andrews & Bonta, 2010).

Reducing crime has benefits for society as well as for offenders. There are economic benefits in lowering crime rates as it is estimated that the cost of crime in Australia is nearly $36b per year; this has increased by 12.5% from 2003 (Mayhew, 2003; Rollings, 2008). During the 2009-10 financial period, approximately $3.4b was spent on corrective services in Australia, with $2.9b (85%) spent on prison services, $409m (12%) spent on community corrections and $96m (3%) spent on transport and escort services. During this same period, a total of $75,611 was spent per prisoner nationally, whereas in comparison, the national expenditure per offender in community corrections was substantially less at $6661 (AIC, 2012).

There are additional benefits in successfully reducing crime. There is evidence that a disproportionate amount of crime, particularly violent crime, is committed by the most persistent adult offenders who account for a relatively small proportion of the total offender population. For example, Yang et al. (2010) provide an estimate that about 50% of all crimes are committed by 5 - 6% of the offender population. A recent study by Goodwin and Davis (2011) examined engagement in criminal activities in six Tasmanian families that were known to police and corrective services. From this study, it could be concluded that there appeared to be support for the intergenerational transmission of crime, with a relatively large proportion of family members from these families having at least one conviction, and/or having served a custodial sentence. Addressing the needs of this population could help enrich the family's life as well as reducing the rate of reoffending.

The term recidivism can be defined as a tendency to relapse or re-engage in a criminal behaviour pattern. In criminological literature, this behaviour leads to a re-entry into the criminal justice system, either by the return of a prisoner to custody, reappearance in court or a further conviction. Recidivism is often used interchangeably with repeat offending and reoffending (Moore, 2000; Payne, 2008; Richards, 2011). The AIC (2013) asserts that the recidivism rate of offenders who returned to prison has remained relatively stable over the past few years. The AIC reported that of the prisoners released in 2008-9, 40% had returned to prison under sentence, with a total of 46% of offenders returning to corrective services (including both prison and community corrections) by the end of the 2011 financial period.

There is an ongoing debate as to whether it is possible to predict an individual's risk of recidivism accurately and whether targeted intervention programs, both within the prison setting and as part of community corrections programs, can reduce recidivism rates. For example, Martinson's (1974) review of numerous interventions suggested that these initiatives have not had a significant impact on reducing future recidivism; that is, "nothing works" (p. 49). Martinson further asserts that framing crime as a "disease" (p. 49) in which it can be treated and/or cured, ignores and denies the normality of crime both within society and within a large proportion of offenders who respond to societal conditions by choosing to engage in crime. However, there is disagreement as to the impact a criminal justice intervention should be expected to have, especially as the influence of the criminal justice system is expected to decline over time once the individual ceases contact with entities such as parole officers (Richards, 2011). Further, if an offender is convicted of a serious offence, such as a violent assault, but ceases contact with criminal justice departments and is later convicted of a driving offence, is this an indication of success in terms of reducing the seriousness of an offender's criminal behaviour, or a failure in that the individual still reoffended?

The risk-needs-responsivity (RNR) model specifies how an offender's criminogenic characteristics should influence the selection and implementation of corrective services. The three principles that underlie the RNR model highlight a variety of factors that contribute to the development of delinquent and criminal behaviours and explanations that are targeted at the general personality and cognitive social learning perspectives. Further, the RNR model also plays a role in informing correctional assessment and rehabilitative programming (Andrews & Bonta, 2010; Poledna et al., 2011).

The risk principle has two aspects: predicting recidivism and matching treatment services to the level of risk of the offender. Risk factors refer to an individual's characteristics and circumstances that may increase the likelihood of engaging in future criminal behaviour. There are two types of risk factors. Static factors are generally historical and cannot be changed, whereas dynamic factors can be changed and are linked to recidivism risk, such as employment, education and prosocial attitudes. Further, an offender’s level of risk should be matched to the level of intervention provided, with individuals identified as being of high risk of recidivism receiving more intensive supervision and/or interventions.

The needs principle states that when an individual’s needs are met in a way that increases an individual’s risk of engaging in criminal conduct, then these needs are termed criminogenic needs; for example, obtaining money through stealing or fraud (Andrews et al., 1990). The RNR model identified the central eight risk and need factors in the prediction of criminal conduct. These include the big four: history of antisocial behaviour, antisocial personality pattern, antisocial cognition and antisocial associates; and the modest four: family/marital circumstance, school/work, leisure/recreation and substance abuse. These factors have received strong empirical support for their predictive utility in assessing an offender’s risk of reoffending (Andrews et al., 2011; Girard & Wormith, 2004; Wormith et al., 2007). Lastly, the responsivity principle considers factors that may impinge on an individual’s response to treatment programs, including cognitive ability, learning style, therapeutic relationships and program content (Ogloff & Davis, 2004).

Risk assessment instruments have undergone a generational process of enhancement (Andrews & Bonta, 2010). First-generation risk assessments consisted of clinical or professional judgement regarding an individual’s risk of recidivism. This method was often discredited due to inconsistencies in judgements because of the lack of standardisation between professionals (Hannah-Moffat, 2005; Meehl, 1954). In the 1970s, statistical prediction was popularised resulting in the second-generation actuarial risk assessments, which employed scales or matrices that were derived from retrospective, evidence-based static factors (Glazebrook, 2010). Although the method of the second-generation instruments employed overcame the pitfalls of the first-generation methods, they were unable to detect changes in an offender due to the prominent nature of static (unchangeable) variables (Storey et al., 2011).

Third-generation risk assessments are based on the RNR model. This model suggests that an individual's risk of reoffending can be reduced by identifying and targeting criminogenic needs (dynamic risk factors), as well as providing interventions that are consistent with the offenders' ability and learning style (Andrews & Bonta, 2010; Hannah-Moffat, 2005). RNR research adopts the notion that men and women, as well as different racial groups, have the same criminogenic needs and that the same theories of offending apply to all these populations. Researchers have reported correlates of recidivism that suggest general risk factors such as criminal history, age, substance use, education and employment are the same regardless of gender (Andrews et al., 2011; McCoy & Miller, 2013; Rettinger & Andrews, 2010). However, other research highlights that there are gender variations in regard to criminogenic needs correlating with recidivism. Such research indicates that the mainstream risk assessment instruments, such as the Level of Service Inventory-Revised (LSI-R; Andrews & Bonta, 1995), have a strong predictive utility for males but not for females, and that other criminogenic needs such as financial troubles and family/marital circumstances are more predictive of future offending behaviour (Hsu et al., 2009; Mihailides et al., 2005). When examining the LSI-R, Palmer and Hollin (2007) also determined that English female offenders demonstrated greater emotional/personal needs and greater involvement in criminal companions and alcohol/drug abuse, whilst male offenders were more likely to hold pro-criminal attitudes. This has implications when predicting risk of reoffending and implementing case-management procedures to attempt to lower recidivism risk. Hannah-Moffat (2006, 2009) argues that risk assessments and correctional agencies do not respond adequately to women's needs during the sentencing procedure, or during completion of the sentence order. This also extends to differing racial groups, and special considerations need to be made when using internationally validated risk assessments. Further research needs to be conducted in regard to offending and risk of offending in females and Indigenous cultures (Hannah-Moffat & Maurutto, 2010). Fourth-generation risk assessments incorporate the same premises as third-generation methods, but are also designed to help guide an offender’s case management through supervision and intervention services/programs from intake through to case closure (Andrews et al., 2006).

The LS/CMI (Andrews et al., 2004) is a fourth-generation instrument that has been adopted and used in various jurisdictions for criminal justice purposes since its development in Canada. The LS/CMI is comprised of 11 sections, plus allows for the accommodation of supplementary information. It consists of 43 items that are grouped into eight general risk/need subscales. These subscales reflect the big eight risk/need factors that have received strong support for their predictive utility in assessing an offender’s risk of reoffending (Andrews et al., 2011).

The LS/CMI has been validated internationally. For instance, a study completed by Guay (2012) examined the predictive utility of the LS/CMI in Quebec gang members. The results demonstrated that the LS/CMI was useful in predicting recidivism in gang members, as well as identifying more significant criminogenic risks and needs compared with a matched non-gang offender sample. However, published research regarding the use of the LS/CMI within Australia is still emerging into the public domain. Other studies are available in which the reliability of the LS/CMI’s predecessor, the LSI-R, has been empirically examined within an Australian context. The results from such studies indicate that risk assessments developed internationally need to be validated and/or adapted in order to improve their predictive utility within an Australian context (Hsu, 2010; Mihailides et al., 2005).

The aim of the current study is to investigate the need profiles and the validity of the LS/CMI for Tasmanian offenders serving community-based orders. Therefore, this study provides normative statistics and specific need profiles for Tasmanian offenders, and investigates the relationship between offenders' LS/CMI total and subscale scores and reoffending. This attempts to provide information as to whether the LS/CMI is accurately predicting risk of recidivism within this population, as well as providing more information on needs, or areas of concern, that are significantly implicated in reoffending. It is hypothesized that the general criminogenic risk factors (criminal history, age, substance use, education and employment) will be predictive of future reoffending for males. However, for females it is hypothesized that females may either share similar criminogenic needs to their male counterparts, or gender differences will become apparent with other LS/CMI subscales, such as Education/Employment, Family/Marital and the Companions subscales, having a higher correlate of future reoffending (Palmer & Hollin, 2007; Hsu, 2010).

Method

Participants and Procedures

For the purposes of this study, data were retrieved from the Offender Information System (OIS) database, which is the Tasmanian Community Corrections database. The criteria for inclusion of individuals' data in the analysis included those who had been sentenced for an offence in 2010, had completed a LS/CMI assessment and were completing either a community-based order or a custodial sentence combined with a supervision period upon release (either at the end of serving a custodial sentence or on parole). Where an individual received multiple sentences in 2010, their index conviction for an offence was chosen based on the most serious offence as classified by the National Offence Index (ABS, 2009).

The final sample included 807 participants. The non-Indigenous sample was comprised of 682 participants. This included 569 males (70.5% of the total sample), with a mean age of 31 years (*SD* = 10.37, range: 18 - 67 years) and 113 females (14% of the total sample), with a mean age of 32 years (*SD* = 9.80, range: 18 - 54 years). For the non-Indigenous sample, a total of 61% of males and 43% of females had prior offences, with 47% of males and 28% of females having served a prior custodial sentence. The mean length of probation for males was 10 months (*SD* = 7.11), and for females was 11 months (*SD* = 9.91). For offenders who were required to complete a Community Service Order, the mean number of hours to be completed was 35 (*SD* = 49.47) for males and 29 (*SD* = 38.67) for females.

The Indigenous sample was comprised 125 participants. This included 96 males (11.9% of the total sample), with a mean age of 28 years (*SD* = 7.98, range: 18 – 52 years) and 29 females (3.6% of the total sample), with a mean age of 29 years (*SD* = 7.98, range: 19 – 46 years). For the Indigenous sample, a total of 60% of males and 48% of females had prior offences, with 53% of males and 38% of females having served a prior custodial sentence. The mean length of probation for males was 10 months (*SD* = 5.54), and for females was 12 months (*SD* = 4.45). For Indigenous offenders who were required to complete a Community Service Order, the mean number of hours to be completed was 31 (*SD* = 48.34) for males and 34 (*SD* = 48.52) for females. Data from Indigenous offenders have been included in the following analyses, but statistical analyses must be interpreted with caution due to the low sample size.

Measures

LS/CMI. The LS/CMI is composed of eight subscales (the number of items on each scale is indicated in parentheses): Criminal History (8), Education/Employment (9), Family/Marital (4), Leisure/Recreation (2), Companions (4), Alcohol/Drug Problem (8), Procriminal Attitude/Orientation (4) and Antisocial Pattern (4). The scores from these subscales are summed to form a total score that informs the level (and the likelihood) of risk of future reoffending for that particular offender. This is known as the General Risk/Need Total score (the Section 1 Total score). Based on the total score, offenders' scores are then categorised from being of very low through to very high recidivism risk. The scores for each category are as follows: Very Low (score of 0-4), Low (score of 5-10), Medium (score of 11-19), High (score of 20-29), and Very High (a score of more than 30). A professional override option is available where the assessor is able to exercise discretion to override the actuarially based risk level that is generated from the Section 1 total score. Subscale scores are summed to obtain a total score for that section. Subscale scores are then able to be categorised using the Very Low to Very High scale, with scores relating to categories varying for each subscale (due to the differing number of items per subscale). The majority of LS/CMI assessments were completed as part of the pre-sentence report. Where a presentence report was unable to be completed, the LS/CMI was completed within the first few months of the offenders’ order.

Reoffending. Because of variances in the length of probation/ supervision, reoffending for the purposes of this study was defined as a reoffence (a formal conviction of an offence) that occurred within 12 months of the index offence, for which the offender was convicted in 2010. For those offenders who received a custodial sentence, data were collected from the date they were released into the community. This ensured that there were boundary limits around the length of the sentence and that all offenders’ reoffending data were for the same time period (Ringland, 2011a; Watkins, 2011). This resulted in a total of 138 individuals (120 males, 18 females) reoffending within a 12-month period following the sentence of their index offence in 2010.

Results

The number of males and females across risk categories is shown in Table 2. As can be seen, the majority of offenders, for both males and females, are located in the medium and high categories as determined by the LS/CMI scoring and cut-off guidelines.

Table 2

Number and Percentage of Participants (By Sex) Across the LS/CMI Risk Categories

	LS/CMI Risk Categories					
Sex	Very Low	Low	Medium	High	Very High	Total
Non-Indigenous Offenders						
Male	4 (0.7)	56 (9.8)	231 (40.6)	215 (37.8)	63 (11.1)	569
Female	2 (1.8)	15 (13.3)	55 (48.7)	31 (27.4)	10 (8.8)	113
Total	6 (0.9)	71 (10.4)	286 (41.9)	246 (36.1)	73 (10.7)	682
Indigenous Offenders						
Male	-	4 (4.2)	29 (30.2)	44 (45.8)	19 (19.8)	96
Female	-	1 (3.4)	9 (31.0)	12 (41.4)	7 (24.1)	29
Total	-	5 (4.0)	38 (30.4)	56 (44.8)	26 (20.8)	125

Note. Percentages are shown in parentheses.

The means and standard deviations on the LS/CMI total and subscale scores are provided in Table 3. *T* tests were conducted to determine if there were significant differences between the scores obtained by Indigenous and non-Indigenous males, and Indigenous and non-Indigenous females. The significantly higher mean scores are marked with an asterisk. In regard to male offenders, Indigenous males scored significantly higher on all of the LS/CMI subscales, with the exception of the Leisure/Recreation subscale, and the LS/CMI Total score in comparison to non-Indigenous males. For female offenders, Indigenous females scored higher on the Leisure/Recreation and Antisocial Pattern subscales as well as the LS/CMI Total score in comparison to non-Indigenous females.

Table 3

LS/CMI Total and Subscale Scores for Males and Females

		Males		Females	
		Indigenous	Non-Indigenous	Indigenous	Non-Indigenous
Criminal History	*M*	5.01*	4.63	4.48	3.92
	SD	1.79	1.71	2.08	1.58
Education/ Employment	*M*	5.00*	4.27	4.86	3.86
	SD	2.90	2.73	2.95	2.46
Family/ Marital	*M*	1.86*	1.55	2.24	1.77
	SD	1.13	1.12	1.30	1.26
Leisure/ Recreation	*M*	1.49	1.34	1.76*	1.34
	SD	0.68	0.73	0.51	0.74
Companions	*M*	2.18*	1.80	2.59	1.87
	SD	1.40	1.34	1.43	1.33
Alcohol / Drug Problem	*M*	4.64*	4.10	4.38	3.66
	SD	2.19	2.14	1.70	2.16
Procriminal Attitude/ Orientation	*M*	1.27**	0.85	1.10	0.78
	SD	1.35	1.16	1.24	1.09
Antisocial Pattern	*M*	1.54*	1.16	1.83**	1.06
	SD	1.11	1.09	1.10	0.97
Total Score	*M*	23.00**	19.73	23.17**	18.02
	SD	7.66	7.60	7.38	7.51

*$p < .05$. **$p < .001$.

The means and standard deviations for both the current sample and the North American total (including both male and female data) community sample normative group presented in the LS/CMI manual are presented in Table 4 for Indigenous males, Table 5 for non-Indigenous males, Table 6 for Indigenous females, and Table 7 for non-Indigenous females.

As can be seen in Table 4, the Tasmanian Indigenous male offenders scored significantly higher across all subscales and LS/CMI Total scores compared to the male and total North American normative group, with the exception of the Procriminal Attitude/ Orientation subscale when compared to the total North American normative group.

Table 4

Means and Standard Deviations and Group Differences between the Current Sample (Indigenous Males) and the LS/CMI North American Normative Group (Males and Total Community Sample)

Scale	Current Sample (N = 96)		North American Males (N = 29,786)		North American Total (N = 39,536)	
	M	*SD*	*M*	*SD*	*M*	*SD*
Criminal History	5.01	(1.79)	2.82	(2.39)**	3.12	(2.45)**
Education/Employment	5.00	(2.90)	3.18	(2.74)**	3.78	(2.80)**
Family/Martial	1.86	(1.13)	1.40	(1.17)**	1.60	(1.24)*
Leisure/Recreation	1.49	(0.68)	1.12	(0.78)**	1.24	(0.79)*
Companions	2.18	(1.40)	1.27	(1.13)**	1.53	(1.24)**
Alcohol/Drug Problem	4.64	(2.19)	2.63	(2.42)**	2.96	(2.61)**
Procriminal Attitude/ Orientation	1.27	(1.35)	1.01	(1.25)*	1.33	(1.48)
Antisocial Pattern	1.54	(1.11)	0.86	(1.04)**	1.18	(1.22)*
Total Score	23.00	(7.66)	14.24	(9.02)**	16.72	(10.11)**

*$p < .05$. **$p < .001$.

As can be seen in Table 5, the Tasmanian non-Indigenous male offenders scored significantly lower on the Procriminal Attitude/Orientation subscale and significantly higher on the remaining subscales and LS/CMI Total score when compared to the male North

American normative group. The Tasmanian non-Indigenous male offenders scored significantly higher on the Criminal History, Education/Employment, Leisure/Recreation, Companions, Alcohol/Drug Problem subscales and the LS/CMI Total score when compared to the total North American normative group (including both male and female data). The total North American normative group scored significantly higher on the Procriminal Attitude/ Orientation subscale.

Table 5

Means and Standard Deviations and Group Differences between the Current Sample (Non-Indigenous Males) and the LS/CMI North American Normative Group (Males and Total Community Sample)

Scale	Current Sample (N = 569)		North American Males (N = 29,786)		North American Total (N = 39,536)	
	M	*SD*	*M*	*SD*	*M*	*SD*
Criminal History	4.63	(1.71)	2.82	(2.39)**	3.12	(2.45)**
Education/Employment	4.27	(2.73)	3.18	(2.74)**	3.78	(2.80)**
Family/Martial	1.55	(1.12)	1.40	(1.17)*	1.60	(1.24)
Leisure/Recreation	1.34	(0.73)	1.12	(0.78)**	1.24	(0.79)*
Companions	1.80	(1.34)	1.27	(1.13)**	1.53	(1.24)**
Alcohol/Drug Problem	4.10	(2.14)	2.63	(2.42)**	2.96	(2.61)**
Procriminal Attitude/ Orientation	0.85	(1.16)	1.01	(1.25)*	1.33	(1.48)**
Antisocial Pattern	1.16	(1.09)	0.86	(1.04)**	1.18	(1.22)
Total Score	19.73	(7.60)	14.24	(9.02)**	16.72	(10.11)**

*p < .05. **p < .001.

As can be seen in Table 6, the Tasmanian Indigenous female offenders scored significantly higher across all subscales and LS/CMI Total scores compared to the female and total North American normative group, with the exception of the Procriminal Attitude/ Orientation subscale when compared to the total North American normative group.

Table 6

Means and Standard Deviations and Group Differences between the Current Sample (Indigenous Females) and the LS/CMI North American Normative Group (Females and Total Community Sample)

Scale	Current Sample Females (N = 29)		North American Females (N = 9,332)		North American Total (N = 39,536)	
	M	*SD*	*M*	*SD*	*M*	*SD*
Criminal History	4.48	(2.08)	1.69	(2.09)**	3.12	(2.45)*
Education/Employment	4.86	(2.95)	3.15	(2.73)**	3.78	(2.80)*
Family/Martial	2.24	(1.30)	1.59	(1.15)*	1.60	(1.24)*
Leisure/Recreation	1.76	(0.51)	0.98	(0.76)**	1.24	(0.79)**
Companions	2.59	(1.43)	1.01	(1.01)**	1.53	(1.24)**
Alcohol/Drug Problem	4.38	(1.70)	1.80	(2.25)**	2.96	(2.61)*
Procriminal Attitude/ Orientation	1.10	(1.24)	0.57	(0.92)*	1.33	(1.48)
Antisocial Pattern	1.83	(1.10)	0.51	(0.78)**	1.18	(1.22)*
Total Score	23.17	(7.38)	11.30	(7.73)**	16.72	(10.11)**

*p < .05. **p < .001.

As can be seen in Table 7, the Tasmanian non-Indigenous female offenders scored significantly higher across all of the LS/CMI subscales (with the exception of the Family/Marital subscale) and the LS/CMI Total score when compared to the female North

American normative group. The Tasmanian non-Indigenous female offenders scored significantly higher on the Criminal History, Companions, and Alcohol/Drug Problem subscales and significantly lower on the Procriminal Attitude/Orientation subscale when compared to the total North American normative group (including both male and female data).

Table 7

Means and Standard Deviations and Group Differences between the Current Sample (Non-Indigenous Females) and the LS/CMI North American Normative Group (Females and Total Community Sample)

Scale	Current Sample Females (N = 113)		North American Females (N = 9,332)		North American Total (N = 39,536)	
	M	*SD*	*M*	*SD*	*M*	*SD*
Criminal History	3.92	(1.58)	1.69	(2.09)**	3.12	(2.45)**
Education/Employment	3.86	(2.46)	3.15	(2.73)*	3.78	(2.80)
Family/Martial	1.77	(1.26)	1.59	(1.15)	1.60	(1.24)
Leisure/Recreation	1.34	(0.74)	0.98	(0.76)**	1.24	(0.79)
Companions	1.87	(1.33)	1.01	(1.01)**	1.53	(1.24)*
Alcohol/Drug Problem	3.66	(2.16)	1.80	(2.25)**	2.96	(2.61)*
Procriminal Attitude/ Orientation	0.78	(1.09)	0.57	(0.92)*	1.33	(1.48)**
Antisocial Pattern	1.06	(0.97)	0.51	(0.78)**	1.18	(1.22)
Total Score	18.02	(7.51)	11.30	(7.73)**	16.72	(10.11)

**p* < .05. ***p* < .001.

Criminogenic Need Profile

Sex differences for Indigenous offenders. Analysis of variance (ANOVA) indicated that there was not a significant sex difference on the LS/CMI total score, F (1, 123) = .01, p = .92, for Indigenous offenders. Multivariate analysis of variance (MANOVA) on the LS/CMI subscale scores indicated a main effect of sex (F (8, 116) = 2.10, p = .041, partial η^2 = .126). Between-subjects effect tests indicated no sex differences were apparent on the subscale.

Sex differences for non-Indigenous offenders. ANOVA indicated that there was a significant sex difference on the LS/CMI total score, F (1, 680) = 4.81, p = .029, with males scoring significantly higher than females. MANOVA on the LS/CMI subscale scores indicated a main effect of sex (F (8, 673) = 4.23, p <.001, partial η^2 = .048). Between-subjects effect tests indicated sex differences on the subscales Criminal History (F (1, 680) = 16.59, p <.001, partial η^2 = .024) and Alcohol/ Drug Problem (F (1, 680) = 3.88, p <.05, partial η^2 = .006). This indicates that males scored significantly higher on the Criminal History and Alcohol/ Drug Problem subscales compared to female offenders.

Differences between Indigenous and non-Indigenous male offenders. ANOVA indicated that there was a significant difference on the LS/CMI total score, F (1, 663) = 15.16, p = <.001, with Indigenous males scoring significantly higher than non-Indigenous males. MANOVA on the LS/CMI subscale scores indicated a main effect for Indigenous status (F (8, 656) = 2.22, p = .025, partial η^2 = .026). Between-subjects effect tests indicated Indigenous differences on the following subscales: Criminal History (F (1, 663) = 4.03, p = .045, partial η^2 = .006), Education/Employment (F (1, 663) = 45.72, p = .017, partial η^2 = .009), Family/Marital (F (1, 663) = 6.57, p = .011, partial η^2 = .010), Companions (F (1, 663) = 6.54, p = .011, partial η^2 = .010), Alcohol/Drug Problem (F (1, 663) = 5.13, p = .024, partial η^2 = .008), Procriminal Attitude/Orientation (F (1, 663) = 10.14, p = .002, partial η^2 = .015), and Antisocial Pattern (F (1, 663) = 9.99, p = .002, partial η^2 = .015). This indicates that Indigenous males scored significantly higher on the above subscales compared to non-Indigenous males.

Differences for Indigenous and non-Indigenous female offenders. ANOVA indicated that there was a significant difference on the LS/CMI total score, F (1, 140) = 10.95, p = <.001, with Indigenous females scoring significantly higher than non-Indigenous females. MANOVA on the LS/CMI subscale scores indicated a main effect for Indigenous status (F (8, 133) = 2.42, p = .018, partial η^2 = .127). Between-subjects effect tests indicated Indigenous differences on the following subscales: Leisure/Recreation (F (1, 140) = 8.41, p = .004, partial η^2 = .057), Companions (F (1, 140) = 6.57, p = .011, partial η^2 = .045), and Antisocial Pattern (F (1, 140) = 13.65, p < .001, partial η^2 = .089). This indicates that Indigenous females scored significantly higher on the above subscales compared to non-Indigenous females.

Validity Estimates

Bivariate correlations (Spearman's Rho) were used to examine the relationship of reoffending to the LS/CMI total and subscale scores, as well as age, by sex. Table 8 presents these correlations. For Indigenous males, the Education/Employment and the LS/CMI Total score were significantly correlated. This indicates that higher scores were correlated with an increase in reoffending. No significant correlations were obtained for Indigenous female offenders. For non-Indigenous offenders significant age and reoffending correlations were obtained for males and females indicating that as age increases, offenders' reoffending decreases. As can be seen, there were significant correlations between the LS/CMI total score, as well as all the LS/CMI subscale scores (excluding the Alcohol/Drug Problem subscale) for non-Indigenous males. This indicates that, for males, an increase on the LS/CMI total and subscale scores is associated with an increase in reoffending. There were no significant correlations between the LS/CMI total and subscale scores for non-Indigenous females.

Table 8

Bivariate Correlations between Reoffending with the LS/CMI Total and Subscale Scores

	Non-Indigenous Offenders		Indigenous Offenders	
Scale	Male	Female	Male	Female
Total LS/CMI Score	.23**	.10	.18	.16
Criminal History	.14**	.05	.20	.09
Education/Employment	.21**	.05	.21*	.30
Family/Marital	.10**	.12	.03	.21
Leisure/Recreation	.13**	.06	-.07	-.20
Companions	.07*	-.05	.04	-.17
Alcohol/Drug Problems	.09	.10	.02	-.20
Procriminal Attitude/Orientation	.18*	.16	.18	.04
Antisocial Pattern	.25**	.10	.12	.09
Age	-.22**	-.23*	-.25*	-.13

* p <.05. ** p <.01.

Sequential Logistic Regression

A sequential logistic regression was used in order to investigate the predictive utility of the LS/CMI in regard to reoffending. The control variable of age was entered into the first step to provide a model of the reoffending outcome. This produced a model that showed whether the control variable predicted outcome. Age was used as a control variable as it has been found to be a predictor of reoffending (for example, Lowenkamp, Holsinger, & Latessa, 2001; Hollin & Palmer, 2006; Holsinger, Lowenkamp, & Latessa, 2006; Hsu, 2010).

LS/CMI Total Score. The control variable of age was entered into the first step to provide a model of the reoffending outcome. The LS/CMI Total score was then added into the second step of the model. The beta coefficients and effect sizes (Exp β) for the models predicting reoffending in Indigenous and non-Indigenous males and females are displayed in Table 9.

Indigenous offenders. The overall successful classification rate for the logistic regression model based on age and LS/CMI Total score was 67% for males and 83% for females. The model successfully predicted outcomes for the 0% of the 32 males and 0% of the 5 females who reoffended, and 100% of the 64 males and 100% of the 24 females who did not reoffend. The probability of recidivism was not significantly predicted by the LS/CMI Total score after controlling for age for males, $\chi^2 = (1, N = 96) = 2.78$, $p = .095$, Cox & Snell $R^2 = .07$, Nagelkerke $R^2 = .09$, or for females: $\chi^2 = (1, N = 29) = .25$, $p = .619$, Cox & Snell $R^2 = .03$, Nagelkerke $R^2 = .05$.

Non-Indigenous offenders. The overall successful classification rate for the logistic regression model based on age and LS/CMI Total score was 78% for males and 84% for females. The model successfully predicted outcomes for the 4% of the 120 males and 0% of the 18 females who reoffended, and 98% of the 447 males and 100% of the 95 females who did not reoffend. The probability of recidivism was significantly predicted by the LS/CMI Total score after controlling for age for males, $\chi^2 = (1, N = 569) = 21.90$, $p < .001$, Cox & Snell $R^2 = .09$, Nagelkerke $R^2 = .14$. The probability of recidivism was not significantly predicted by the LS/CMI Total score after controlling for age for females: $\chi^2 = (1, N = 113) = .52$, $p = .47$, Cox & Snell $R^2 = .06$, Nagelkerke $R^2 = .11$.

Table 9

LS/CMI Total Score as a Predictor of Reoffending

		B	SE of β	Exp(β)	CI of Exp(β)
Indigenous Offenders					
Male	Age (2010)	-.05	.031	.953	.90 - 1.01
	Total Score	.05	.030	1.05	.99 - 1.11
Female	Age (2010)	-.05	.08	.955	.82 - 1.11
	Total Score	.04	.07	1.04	.90 - 1.19
Non-Indigenous Offenders					
Male	Age (2010)	-.06**	.014	.94	.92 - .97
	Total Score	.07**	.015	1.07	1.04 - 1.10
Female	Age (2010)	-.08*	.034	.93	.87 - .99
	Total Score	.03	.035	1.03	.96 - 1.10

* $p < .05$. ** $p < .001$.

The results indicate that for non-Indigenous males and females, an increase in age is associated with a decrease in the likelihood of reoffending. For males an increased LS/CMI score is also associated with a greater likelihood of reoffending after controlling for the effects of age. However, this is a relatively weak effect size based on the value of Exp (β). This means that for each one unit increase in the LS/CMI Total score, the chances of recidivism increases by 0.07.

LS/CMI Subscale Scores. The control variable of age was entered into the first step to provide a model of the reoffending outcome. The LS/CMI Total score was then added into the second step of the model.

Indigenous offenders. The overall successful classification rate for the logistic regression model based on age and the LS/CMI subscale scores was 67% for males and 83% for females. The model successfully predicted outcomes for the 0% of the 32 males and the 0% of the 5 females who did reoffend, and 100% of the 64 males and 100% of the 24 females who did not reoffend. The probability of recidivism was significantly predicted by the

LS/CMI subscale scores after controlling for age for males: χ^2 = (8, N = 96) = 19.65, p < .01, Cox & Snell R^2 = .18, Nagelkerke R^2 = .25. The model was uninterpretable for Indigenous females due to a low sample size.

When the LS/CMI Total score was replaced by the LS/CMI Subscale scores (see Table 5), the Leisure/Recreation subscale was a predictor of reoffending for males, with an increased score being predictive of a greater likelihood of reoffending.

Non-Indigenous offenders. The overall successful classification rate for the logistic regression model based on age and the LS/CMI subscale scores was 78 percent for males and 85 percent for females. The model successfully predicted outcomes for the 13 percent of the 120 males and the 17 percent of the 18 females who did reoffend, and 96 percent of the 447 males and 98 percent of the 95 females who did not reoffend. The probability of recidivism was significantly predicted by the LS/CMI subscale scores after controlling for age for males: χ^2 = (8, N = 569) = 44.24, p < .001, Cox & Snell R^2 = .13, Nagelkerke R^2 = .20. The probability of recidivism was not significantly predicted by the LS/CMI subscale scores after controlling for age for females: χ^2 = (8, N = 113) = 10.23, p = .251, Cox & Snell R^2 = .14, Nagelkerke R^2 = .24.

When the LS/CMI Total score was replaced by the LS/CMI Subscale scores (see Table 10), the Criminal History and Antisocial Pattern subscales were predictors of reoffending for males, with an increased score being predictive of a greater likelihood of reoffending. For males and females the Companions subscale was negatively predictive of reoffending; that is, those who socialised more with individuals are less likely to reoffend.

Table 10

LS/CMI Subscale Scores as a Predictor of Reoffending

		B	SE of β	Exp(β)	CI of Exp(β)
Indigenous Offenders					
Male	Age (2010)	-.07	.041	.93	.86 - 1.01
	Criminal History	.33	.164	1.39	1.01 - 1.92
	Education/ Employment	.18	.120	1.19	.94 - 1.51
	Family/ Marital	.10	.249	1.10	.68 - 1.79
	Leisure/ Recreation	-.85*	.421	.43	.19 - .98
	Companions	-.10	.205	.91	.61 - 1.36
	Alcohol/ Drug Problem	.04	.127	1.04	.81 - 1.33
	Procriminal Attitude/ Orientation	.36	.223	1.43	.93 - 2.22
	Antisocial Pattern	-.26	.338	.77	.40 - 1.50
Non-Indigenous Offenders					
Male	Age (2010)	-.07**	.015	.93	.91 - .96
	Criminal History	.18*	.077	1.20	1.03 - 1.40
	Education/ Employment	.06	.051	1.07	.97 - 1.18
	Family/ Marital	.09	.105	1.09	.89 - 1.34
	Leisure/ Recreation	.34	.180	1.40	.99 - 2.00
	Companions	-.36**	.111	.70	.56 - .87
	Alcohol/ Drug Problem	.01	.057	1.01	.91 - 1.13
	Procriminal Attitude/ Orientation	.15	.110	1.16	.93 - 1.44
	Antisocial Pattern	.33*	.155	1.39	1.02 - 1.88
Female	Age (2010)	-.11*	.041	.90	.83 - .97
	Criminal History	.29	.228	1.34	.86 - 2.10
	Education/ Employment	-.15	.166	.86	.62 - 1.19
	Family/ Marital	.43	.290	1.54	.87 - 2.72
	Leisure/ Recreation	.21	.470	1.24	.49 - 3.11
	Companions	-.60*	.302	.55	.30 - .99
	Alcohol/ Drug Problem	.14	.145	1.15	.87 - 1.53
	Procriminal Attitude/ Orientation	.52	.326	1.68	.89 - 3.18
	Antisocial Pattern	-.24	.534	.79	.28 - 2.24

* $p < .05$. ** $p < .001$.

Receiver Operator Characteristic (ROC) analysis

This section investigates the validity of the LS/CMI in predicting reoffending using the receiver operator characteristic (ROC) analysis. This procedure produces a ROC curve where true positive rates are plotted against false positive rates in order to display a trade-off between sensitivity (those offenders who are correctly identified as being of at risk of reoffending and actually reoffend) and specificity (those offenders who are correctly classified as being of low risk of reoffending and do not reoffend; Metz, 2006). The ROC method has been demonstrated to not be affected by base rates and is independent of selection ratios. This is important as reoffending base rates can vary as a function of sex and other factors, such as ATSI status (Watkins, 2011). As a result, the ROC analysis provides a measure of discriminative accuracy, with greater values suggesting that the diagnostic tool has greater predictive validity. The observed area under the curve (AUC) is a measure of the overall performance of the LS/CMI in predicting reoffending. The AUC statistic can be interpreted as the probability that a randomly selected recidivist will have a higher risk score than will a randomly selected non-recidivist. A coefficient of .50 shows a chance level of accuracy in prediction; the closer the AUC is to 1, the better the LS/CMI is in correctly predicting reoffending, with 1.00 indicating perfect prediction (Park, Goo & Jo, 2004).

Indigenous offenders. For Indigenous offenders, the AUC for males (AUC = .601, 95% CI [.483, .735]) and for females (AUC = .621, 95% CI [.297, .945]) was not significant. This may be due in part to the small sample of Indigenous male and female offenders, including those who reoffended, resulting in poor statistical power to detect any significant differences.

Non-Indigenous offenders. Whilst the AUC for non-Indigenous males on the LS/CMI total score was significant at the p <.001 level, the actual value (AUC=.664, 95% CI [.611, .717]) suggests only a weak discriminative ability (Park et al., 2004). The AUC for non-Indigenous females was not significant (AUC=.575, 95% CI [.433, .717]). Again, this may be due to the small sample of female offenders, resulting in poor statistical power to detect any significant differences.

Discussion

The objectives of this study were to investigate the needs profiles of Tasmanian offenders who were completing community based orders, as well as examining the validity of the LS/CMI in terms of predicting reoffending in this sample of offenders. In regard to Indigenous and non-Indigenous differences, Indigenous males scored significantly higher on the LS/CMI Total score and across all of the LS/CMI subscales with the exception of the Leisure/Recreation subscale, in comparison to non-Indigenous males. Indigenous females scored significantly higher than non-Indigenous females on the Leisure/Recreation and Antisocial Pattern subscales, as well as the LS/CMI Total score.

The subscale and LS/CMI total scores for males and females were compared with the North American total community sample normative group presented in the LS/CMI manual. The Tasmanian Indigenous male offenders scored significantly higher across all subscales and LS/CMI Total scores compared to the male and total North American normative group, with the exception of the Procriminal Attitude/Orientation subscale when compared to the total North American normative group. Non-Indigenous male offenders scored significantly lower on the Procriminal Attitude/Orientation subscale and significantly higher on the remaining subscales and LS/CMI Total score when compared to the male North American normative group. The Tasmanian male offenders scored significantly higher on the Criminal History, Education/Employment, Leisure/Recreation, Companions, Alcohol/Drug Problem subscales and the LS/CMI Total score when compared to the total North American normative group (including both male and female data). The total North American normative group scored significantly higher on the Procriminal/Attitude Orientation subscale compared to non-Indigenous male offenders. Tasmanian Indigenous female offenders scored significantly higher across all subscales and LS/CMI Total scores compared to the female and total North American normative group, with the exception of the Procriminal Attitude/ Orientation subscale when compared to the total North American normative group. Non-Indigenous female offenders scored significantly higher across all of the LS/CMI subscales (with the exception of the Family/Marital subscale) and the LS/CMI total score when compared to the female North American normative group. The Tasmanian non-Indigenous female offenders scored significantly higher on the Criminal History, Companions, and Alcohol/Drug Problem subscales and significantly lower on the Procriminal Attitude/ Orientation subscale when compared to the total North American normative group.

There was deemed to be a significant sex difference between Indigenous and non-Indigenous offenders. Male Indigenous offenders scoring significantly higher on the LS/CMI Total score in comparison to Indigenous female offenders. Non-Indigenous males scored significantly higher on the LS/CMI total score and scoring higher on the Criminal History and Alcohol/Drug Problem subscales compared to non-Indigenous female offenders.

For Indigenous males, a higher score on the Education/Employment subscale and LS/CMI Total score were significantly correlated with reoffending. There were no significant correlations for Indigenous female offenders. For non-Indigenous offenders, the LS/CMI Total score, the offenders’ age and all of the LS/CMI subscale scores (excluding Alcohol/Drug Problems) were significantly correlated with reoffending for males, but only the offenders’ age was significantly correlated with reoffending for females.

The sequential logistic regression indicated that for Indigenous males the LS/CMI Total score was predictive of recidivism. In regard to the LS/CMI subscales, for Indigenous males an increased score on the Leisure/Recreation subscale was predictive of a greater likelihood of reoffending. The model for Indigenous females was uninterpretable due to a low sample size. For Non-Indigenous males and non-Indigenous females an increase in age was associated with a decrease in the likelihood of reoffending, whereas an increase in the LS/CMI Total score was predictive of recidivism in non-Indigenous males only. In terms of the subscale scores, for non-Indigenous male offenders, a higher score on the Criminal History and Antisocial Pattern subscales were predictive of a greater likelihood of reoffending. For non-Indigenous males and females, a higher score on the Companions subscale was predictive of a decreased likelihood of reoffending. An unusual finding from the sequential logistic regression analyses was that for non-Indigenous male offenders the Companions subscale was negatively associated with reoffending. This indicates that greater socialisation with offending peers is associated with a decrease in reoffending, which is contrary to previous literature (for example, Andrews et al., 1990, Andrews & Bonta, 2010). This requires further investigation in the Tasmanian offender population, especially in regard to research conducted by Goodwin and Davis (2011), which suggests in Tasmania there is an intergenerational transmission of crime where families tend to have a large number of criminal offences. As a result, the Companions subscale may need to take into account family members who are engaged in criminal activities, as opposed to scoring this under Family/Marital subscale where only one item is scored as to whether a family member or a spouse has a criminal record.

From the ROC analyses, the AUC was not significant for Indigenous male and female offenders, and this may be due to the small sample size of Indigenous offenders resulting in poor statistical power to detect any significant differences. For non-Indigenous offenders, the AUC was deemed significant for male offenders, but not for female offenders. However, it is likely that the small sample size for females (N = 113) would have reduced statistical power for the analyses and hence these findings should be interpreted with caution. However, the logistic regression analyses also suggest that the LS/CMI is not specifically useful for female offenders. The results from this study suggest that the LS/CMI, as currently used in the Tasmanian Department of Justice and Community Corrections has a slightly better predictive ability for non-Indigenous males in comparison to non-Indigenous female and Indigenous offenders.

Research regarding the use of the LS/CMI is only beginning to emerge in the public domain, particularly in Australia. However, its predecessor, the LSI-R, has been investigated in Australian jurisdictions. From these studies, there have been various issues with respect to using the LSI-R norms data. One issue is that Australian offenders' scores are significantly higher than their Canadian counterparts, and that this difference is more apparent for Australian female offenders (Mihailides et al., 2005).

A study by Hsu (2010) examined the LSI-R in an Australian offender population. The results of this study indicated that there were gender variations on subscales of the LSI-R. Further, differences were highlighted between Indigenous and non-Indigenous offenders, where Indigenous offenders' scores were significantly higher than non- Indigenous offenders' scores across all subscales. Their findings also indicated that the LSI-R was able to identify fewer criminogenic need factors for female offenders, especially Indigenous female offenders. This has implications because, without knowledge of criminogenic needs, it is often difficult to provide a supervision management plan and/or interventions that successfully reduce the likelihood of recidivism. Therefore, future research is needed to explore why the LS/CMI, and other similar risk assessment instruments, do not apply or capture the risk and needs of the female offender population.

The results from the current study are comparable with previous LSI-R studies in that the LS/CMI was able to predict risk of recidivism and some criminogenic needs in non-Indigenous males. However, it struggled to predict risk of reoffending and criminogenic needs for Indigenous males and females, and non-Indigenous females. The RNR model adopts a gender-neutral approach in that the same dynamic factors and theories of offending do not differ for males and females, and this approach also extends to racial groups. This has implications when predicting risk of reoffending and implementing case-management procedures to attempt to lower recidivism risk. Hannah-Moffat (2006, 2009) argues that risk assessments and correctional agencies do not adequately respond to women's needs during the sentencing procedure, or during completion of the sentence order. This also extends to differing racial groups and are areas requiring further investigation.

A variable that was not controlled for, but could affect an offender's recidivism risk, included participation in and successful completion of an intervention program, as well as the intensity of the supervision management plan for each offender (e.g., weekly or fortnightly supervision meetings). Standard protocols for Community Corrections in Tasmania include placing offenders who are identified as being of a high risk of offending on a more intensive supervision management plan and a higher level of intervention than offenders who have been identified as being of a lower risk. This higher level of supervision and intervention may result in a reduced rate of reoffending, thus impacting the relationship between the LS/CMI and reoffending (Ringland, 2011a). Therefore, it is suggested that this is accounted for in future studies, which could also possibly explore whether, and what kind of interventions reduce an individual's likelihood of reoffending. In regard to developing risk assessments, it would be difficult to develop a risk assessment in an offender population that has not had any intervention. This is due to the impact of previous interventions chronic recidivists may have completed, as well as ethical considerations in denying offenders access to interventions in order to develop the risk assessment. Further, offenders deemed as being of lower risk may not have received any interventions and thus skew data collected if only those offenders who had not received interventions were to be used to develop risk assessments.

The sample consisted primarily of community- based offenders (79.6%), with a small percentage receiving a combined community and custodial sentence (19.2%) or a custodial sentence followed with a period of supervision (1.2%). Further, in terms of risk category, the distribution of offenders was concentrated in the medium- to high-risk categories for both males and females. This may reflect a sampling bias, as well as a lack of variance within the data resulting in difficulty observing strong relationships between variables (Guay, 2012; Ringland, 2011b). Because of this, the results obtained from this study may not be applicable across all offender sentencing categories and may be biased towards offenders classified as being medium to high risk. However, because of the smaller population in Tasmania, this may also be a true reflection of the Tasmanian offender population and therefore provides important information in terms of providing interventions and services to reduce rates of reoffending. Further research is needed to determine if this is the case.

In conclusion, the present study demonstrates that the LS/CMI, as it is currently used in Community Corrections in Tasmania, has a weak predictive validity for non- Indigenous male offenders. The preliminary findings suggest that the LS/CMI predicts recidivism in Indigenous males and females, and non-Indigenous female offenders at an accuracy level no greater than chance, although this finding should be interpreted with caution given the relatively small sample of Indigenous males (N = 96), Indigenous females (N = 29), and non-Indigenous female offenders (N = 113). Previous research indicates low predictive ability may be a pitfall of the LS/CMI and LSI-R instruments when used outside the Canadian/American jurisdictions. For example, Hsu (2010) and Hannah-Moffat (2006, 2009) mention the need to validate such instruments as research indicates that the normed reference groups for such instruments are not readily generalised to other jurisdictions. Therefore, it is imperative that the LS/CMI be validated and/or tailored to meet the needs of Australian offenders.

3

Psychometric Evaluation of the Level of Service/Case Management Inventory Among Australian Offenders Completing Community-Based Sentences

Heidi Gordon[1], Sally F. Kelty[1] and Roberta Julian[1]

[1]Tasmanian Institute of Law Enforcement Studies (TILES), University of Tasmania, Hobart, Australia

Study 2: Psychometric evaluation of the *Level of Service/Case Management Inventory* among Australian offenders completing community-based sentences

Study Overview

It is important to validate any assessment tool in the population in which it is intended to be used. Girard and Wormith (2004) note the importance of periodic cross-validation, as well as updating test items, due to ever-changing laws, legal terms, and offender populations. Further, there is a concern regarding the transferability of the Level of Service Inventories norms across jurisdictions (Schlager & Simourd, 2007). As a result, Study 2 aimed to examine the factor structure of the LS/CMI using Australian offenders who were completing community-based orders.

In regard to the factor structure, it was hypothesised that the identified LS/CMI factor model would be similar to that identified in Canadian/American offenders (i.e., a two-to-three factor model) and that the model would fit the data well. As the LS/CMI has previously been psychometrically validated in Canada and the United States, it was hypothesised that the internal reliability of the LS/CMI (as measured using Cronbach's alpha) will retain its reliability within the Australian sample. The predictive utility of the LS/CMI was examined using logistic regression analysis.

The results of study 2 indicated that the LS/CMI total score achieved excellent internal reliability. However, there is some concern regarding the capacity for the subscales to function independently. A factor analysis determined a two-factor solution at a subscale level. A more diverse 12-factor solution was obtained at an item-level. The LS/CMI was determined to be predictive of recidivism, but there was a weak effect.

The results of this study indicated that the LS/CMI as it is currently used in this population may not be the most appropriate assessment tool for measuring an offenders' recidivism risk, requiring further research before an international risk assessment is adopted in an Australian jurisdiction. All analyses for this chapter can be located in Appendix B.

The following chapter is presented as a published journal article. The published journal article is accessible from:

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Psychometric evaluation of the *Level of Service/Case Management Inventory* among Australian offenders completing community-based sentences

Heidi Gordon, Sally F. Kelty and Roberta Julian

Tasmanian Institute of Law Enforcement Studies (TILES), University of Tasmania, Hobart, Australia

Abstract

Risk assessment inventories play a significant role in predicting recidivism risk and informing parole and community supervision orders. This article examines the effectiveness of the LS/CMI in a study of Australian offenders completing community-based sentences. The study aimed to identify the internal reliability and the factor structure of the LS/CMI. The results indicated that the LS/CMI total score achieved excellent internal reliability. There is concern regarding the capacity for the subscales to function independently. A factor analysis determined a two-factor solution at a subscale level, whereas a more diverse factor solution was obtained at an item-level. The LS/CMI was determined to be predictive of recidivism, but this was a weak effect. The results indicate that the LS/CMI as it is currently used in this population may not be an appropriate assessment tool, requiring further research before an international risk assessment is adopted in Australian jurisdictions.

KEYWORDS: recidivism, reoffending, Level of Service/Case Management Inventory (LS/CMI), Australian offenders, factor analysis, logistic regression, risk assessment

While risk assessment inventories play a significant role in both predicting recidivism risk and informing parole and community supervision orders, they also help guide correctional staff to determine an offender's suitability to programs and interventions to reduce future reoffending. This has the flow on effect of enhancing public safety by protecting people from criminal behaviours. Rigorous risk assessment is crucial in identifying and managing offenders, particularly those who are deemed as being of a high risk of reoffending (Kemshall, 2008). Risk assessments are used for the purpose of measuring the probability that an individual will engage in dangerous or maladjusted behaviours, including behaviours that are against socially acceptable norms such as rule violation and risk taking (Champion, 1994). An assessment of an offender's recidivism risk can impact upon the individual in various ways, including how his/her case is presented in court and the pre-sentence report, as well as what happens to the offender once he/she have been sentenced. This can include, for example, security classification, community orders, and parole conditions.

Recidivism and Risk Assessment

In criminological research, recidivism is generally used to describe an individual reverting back to, or re-engaging in, criminal behaviour that leads to a re-entry into the criminal justice system (Maltz, 1984; Payne, 2008). It is estimated that about 60% of those in custody in Australia have been previously imprisoned (Drabsch, 2006). Further, there is evidence that a disproportionate amount of crime, particularly violent crime, is committed by the most persistent adult offenders who account for a relatively small proportion of the total offender population. For example, Yang et al. (2010) provide an estimate that about 50% of all crimes are committed by 5 to 6% of the offender population. In Australia during 2012, the majority of recorded crime constituted of assaults and occurred at a rate of 969 victims per 100,000. In this same period, 30% of the most serious offences committed by male police detainees was a violent offence, and for females 27% of offences comprised of property offences (AIC, 2014).

Many contemporary correctional practices, including attempting to assess an offender's recidivism risk, are based upon the Risk-Need-Responsivity (RNR) model (Andrews & Bonta, 2010). This model has its conceptual basis in personality and social learning theories of human behaviour and recognises that there are dimensions of personality on which most, if not all, individuals can be located. The RNR has three core underlying principles, which include risk, need, and responsivity. The risk principle has two aspects, including predicting recidivism and matching treatment services to the level of risk of the offender. Need refers to prioritising identified criminogenic needs for treatment. Finally, responsivity principles considers factors that may impinge on an individual's response to treatment programs, including cognitive ability, learning style, therapeutic relationships, and program content (Andrews & Bonta, 2010; Ogloff & Davis, 2004).

Many of the current risk assessment instruments used in various jurisdictions are based upon the principles of the RNR model, and an accurate risk assessment is the foundation of work utilising the RNR principles. There exists empirical support for the RNR model. Research presented by Andrews and Bonta (2010) indicates a small to medium effect size when all three of the RNR principles are adhered to in correctional justice agencies. However, when only two of the three principles are adhered to, this drops to a small effect size. Further, Andrews and Bonta indicate that nonadherence with the RNR principles may actually increase crime and recidivism. This suggests that utilising the RNR theoretical framework within criminal justice practices is effective in reducing and responding to an offenders' recidivism risk.

It is important to ensure that the risk assessment being utilised is empirically and psychometrically valid. This has repercussions, not only on the accuracy of the information obtained from which many decisions are based, but can also affect the rights of the offender. An offender’s sentence, including supervision and engagement in interventions, cannot be unjustly intensive or extended for a prolonged period of time as a preventative measure to address reoffending concerns or to protect public safety without undue cause of concern. That is, from a human rights perspective, an offender’s sentence cannot be unfairly restrictive or disproportionate to the crime that he/she has committed. To do so would raise concerns as their liberty would be restricted due to an inaccurate assessment of their possible future behaviour or recidivism risk (Glazebrook, 2010). Therefore, it is important that the risk assessments currently used by expert witnesses and agencies have been empirically validated in the population among whom the assessment is intended to be used. Further, when making recommendations it is crucial for test administrators to be mindful of the court’s need to balance the offender’s rights with the rights of society (including current and potential victims) when deciding to impose sentences or conditions based on recidivism risk (Yanget al., 2010).

The LS/CMI and Australian Studies

The LS/CMI was developed as a result of one of the most well-researched risk/need instruments, the Level of Supervision Inventory (LSI), which was designed to assist probation officers in planning their supervision of probationers and parolees (Andrews, 1982). The LS/CMI was developed as a case management tool for correctional workers, as well as trying to adopt a systematic measure to ensure continuity of care across correctional agencies. The LS/CMI consists of 43 items that are grouped into eight general risk/need subscales. These subscales reflect the big eight risk/need factors that have received strong support for their predictive utility in assessing an offender's risk of reoffending. These factors include, listed in order of influence: history of antisocial behaviour, antisocial personality pattern, antisocial cognitions, antisocial associates, family/marital, school/work, leisure/recreation, and substance abuse (for a full discussion see: Andrews et al., 2011; Andrews & Bonta, 2010).

The LS/CMI is the commercially available version of the LSI-OR (Girard & Wormith, 2004). The LSI-OR has been validated on 630 adult male offenders, consisting of 454 inmates and 176 probationers under community supervision, and the results indicate that it is a psychometrically valid instrument. The LSI-OR consists of several sections. The General Risk/Need section consists of 43 items that cover the offenders' history and personal characteristics, reflecting the central eight risk/need factors corresponding to recidivism. The Specific Risk/Need section consists of two subscales (Personal Problems with Criminogenic Potential and History of Perpetration) that address personal problems that may have criminogenic potential and the offenders' history of perpetration. The results of Girard and Wormith's research indicated that the internal consistency of the General Risk/Need items was excellent ($\alpha = .91$). The internal consistency for the Specific Risk/Need Section was acceptable ($\alpha = .62$). Alpha coefficients for the subscales in the General/Risk Need section varied from .32 (Family/Marital) to .80 (Criminal History). For general recidivism, the LSI-OR's predictive capacity for both inmates (multiple $R = .37$) and the community group (multiple $R = .40$) was significant. The LSI-OR's predictive capacity was also significant for violent recidivism for both inmates (multiple $R = .42$) and the community group (multiple $R = .25$). ROC analyses determined that the General Risk/Need section was better able to predict general recidivism (AUC = .73), while the Specific Risk/Need section was better able to predict violent recidivism (AUC = .71).

A more recent study (Guay, 2012) examined the predictive utility of the LS/CMI in a sample of Quebec gang members. The results demonstrated the LS/CMI was able to identify more significant criminogenic risks and needs in gang members compared to a matched non-gang offender sample. Specifically, in the gang members' criminal histories, crimes against persons occurred at a higher rate than non-gang members. Further, on the LS/CMI, gang members scored significantly higher on all subcomponents, with the exception of the Family/Marital and Alcohol/Drug Problems subscales. In regard to predictive utility, ROC analyses identified that the LS/CMI was able to predict new general recidivism arrests for both gang (AUC = .71) and non-gang (AUC = .73) offenders. However, the quality of the prediction was lower for predicting new arrests for violent crimes for both gang (AUC = .56) and non-gang (AUC = .61) offenders, therefore suggesting that the LS/CMI is more suited to the prediction of general recidivism in comparison to violent reoffending.

The above research by Girard and Wormith (2004) and Guay (2012) indicates that the LS/CMI may be more suited to predicting general recidivism, whereas agencies may need to administer a specialised violent risk assessment if that is what they are wishing to predict. This appears to be supported by more recent research by Olver et al. (2014) who conducted a comprehensive meta-analysis of the various Level of Service Inventories. The results of their research supported the predictive accuracy of the various Level of Service scales and their criminogenic need domains for both general and violent recidivism. Further, while gender and ethnicity were determined to not be substantive sources of effect size variability, differences were apparent when analyses were conducted by geographic region. Canadian samples produced the largest effect size variability, followed by studies conducted outside North America, and then studies conducted within the United States. This suggests that geographic region may be an important source of effect size variation, but not author allegiance or affiliation. The LS/CMI was determined to have predictive accuracy for general recidivism, with a significant medium to large effect size, and a significant small effect size was obtained for violent recidivism. Again, this research indicates that the LS/CMI's strength lies in predicting general recidivism in comparison to violent recidivism.

There is limited Australian research that evaluates the use and predictive utility of the LS/CMI. However, research is available that assessed its predecessor, the LSI-R. This information can be used to explore the validity and predictive utility of the Level of Service inventories in an Australian population. The results from such studies indicate that risk assessments developed internationally need to be validated and/or adapted in order to improve their predictive utility within an Australian context. For example, Hsu's research (2010) determined that there were gender variations on subscales of the LSI-R, as well Indigenous offenders' scores were consistently higher than the scores of non-Indigenous offenders. Mihailides et al. (2005) questioned the appropriateness of using Canadian norms to identify Australian offenders' level of risk of recidivism due to Australian offenders scoring higher across LSI-R subscales compared to Canadian offenders.

However, Watkins (2011) evaluation of the LSI-R in a sample of New South Wales custody-based offenders indicated that in terms of discriminative ability, the LSI-R is performing similarly to its use internationally. In terms of AUC values, the highest was obtained for non-Indigenous males (AUC = .694), closely followed by non-Indigenous females (AUC = .687). From analyses of survival time, there was evidence that offenders classified as being high risk do reoffend at higher rates and at a faster rate than offenders classified as being of lower risk. The LSI-R's Cronbach's alphas, reflecting internal consistency, ranged from adequate ($\alpha = .51$ for the accommodation subscale) to good ($\alpha = .78$ for the Education/Employment subscale).

Research conducted by Ringland (2011a) also supports the use of the LSI-R in Australia. Ringland examined the predictive utility of the LSI-R subscale scores in a model of recidivism using data obtained from Corrective Services New South Wales. The results indicated that for males and females, after controlling for standard risk factors, the subscales education/employment and attitudes/orientation were associated with reoffending. There were also gender variations apparent on subscales associated with reoffending. In terms of predictive utility, the rate of reoffending within a 12-month period increased as the offenders risk level increased. The odds of reoffending were higher for offenders classified as being of medium risk (4.0 for males, 4.6 for females) than the odds of those classified as being at a low risk. Further, the reoffending odds for offenders classified as high risk were high than offenders classified as low risk (12.8 for males, 10.7 for females). Ringland suggests that the inclusion of the LSI-R subscale scores in models of recidivism (as opposed to only including the LSI-R total score) could help improve the predictive utility of models of recidivism for evaluation.

Underlying Construct Structure of the Level of Service Inventories

Due to the distinct needs of offenders from different jurisdictions, it is argued that the underlying constructs of the Level of Service inventories may differ for, or not apply to, Australian offenders (Hsu, 2010). Hanson, Babchishin, Helmus, and Thornton (2013) argue that empirical actuarial risk tools are not designed to be internally consistent measures of a single latent construct; that is, a variable that cannot be observed or measured directly. Rather, risk assessments are designed by selecting items based on their relationship with the designated outcome, for example, general recidivism, and are therefore criterion-referenced measures. Items may be retained in a risk assessment even when their relevance to recidivism is unknown but they are able to predict recidivism. An example of this includes the “Any Unrelated Victims” item on the Static-2002, which independently contributed to the prediction of sexual recidivism at the $p < .001$ level (Hanson & Thornton, 2003). As a result, risk assessments rarely contain homogenous items as a good risk scale will contain diverse psychologically meaningful risk factors that have been established as relating to engagement in antisocial/criminal behaviours and recidivism (Mann, Hanson, & Thornton, 2010). However, exploring the theoretical nature of the underlying constructs of the risk assessment provides information about the appropriateness of the assessment for the population in which it is intended to be used. The LS/CMI has been used in other jurisdictions with the assumption that the factors would be transferable between populations with an unclear level of support for this assumption (Schlager & Simourd, 2007). Understanding the factor structure of an assessment within a target population is important as a factor analysis identifies groups or clusters of items (otherwise known as variables) on an assessment. These clusters of items suggest that they could be measuring the same underlying dimensions, or factors, and are related to each other (Field, 2005). Identifying a differing factor structure on an assessment may indicate that, in this instance, the target population has differing risks or needs than the original population sample, requiring the instrument to be recalibrated in the target population. Doing so could result in an increase in accuracy in identifying recidivism risk and predicting reoffending.

Due to the limited available research investigating the factor structure of the LS/CMI, it is useful to refer to research regarding the LSI-R. Various studies have investigated the LSI-R and how its subscales can be arranged into fewer factors. Studies have identified a three-factor solution in Canadian probationers (Andrews & Robinson, 1984), and in Colorado probationers (Arens et al., 1996). Another study by Loza and Simourd (1994) determined that a two-factor solution identified in Colorado inmates was comparable with Canadian federal male inmates.

A study conducted by Hollin et al. (2003) examined the factor structure of the LSI-R in a sample of English male offenders. Their results indicated a two-factor solution with the first factor accounting for 41% of the variance. The first factor consisted of the scales that are associated with criminal conduct (Criminal History, Education/Employment, Leisure/Recreation, Companions, Alcohol/Drug Problems, and Procriminal Attitudes/Orientation). The first factor is consistent with Loza and Simourd's (1994) research, with the Criminal History, Education/Employment, Finance, and Attitudes/Orientation subscales loading on the factor concerning criminal behaviour or lifestyle. The second factor accounted for 10.2% of the variance and consisted of those subscales reflecting personal issues or life-style factors (Family/Marital, Accommodation, and Emotional Personal). This second factor was consistent with that determined by Loza and Simourd (1994) with the exception that the Leisure/Recreation and Alcohol/Drug Problem subscales also loaded onto the second factor. The Finance subscale did not load onto either factor. In contrast, Palmer and Hollin's (2007) research with English female offenders produced a one-factor solution that accounted for 38.8% of the explained variance. When a two-factor solution was forced, only the Emotional/Personal subscale loaded on the second factor. The Attitude/Orientation subscale did not load on either of the two factors.

An Australian study by Hsu et al. (2011) examined the LSI-R at an item level which produced a five-factor solution for male offenders consisting of Static Risk, Employment, Pro-Criminal Attitudes, Mental Health, and Protective Companions. The fifth factor for males was labelled Protective Companions and consisted of two items addressing acquaintances and friends not involved in criminal activity which could act as protective factors in relation to future offending. A four-factor solution for female offenders was obtained consisting of Static Risk, Employment, Pro-Criminal Attitudes, and Mental Health. Andrews and Bonta (1995) have noted that studies have not revealed a consistent factor structure for the LSI-R and suggest that the LSI-R's factor structure may depend upon the population and setting in which it is administered. As these studies demonstrate, fluctuations between jurisdictions may occur requiring the instrument to be calibrated to the specific population. It is appropriate to assume that this line of argument could also apply to the LS/CMI.

The variations in how the subscales load onto common factors may be the result of the heterogeneous nature of the offender population, as well as jurisdictional differences

(Maurutto & Hannah-Moffat, 2007). Further, the analytical approaches may also influence each of the factor solutions, for example Principal Components Analysis (groups common variances) in comparison to factor analysis, which identifies latent dimensions or constructs (Child, 1990; Costello & Osborne, 2005). Due to the lack of research regarding the factor structure of the LS/CMI, combined with varied factor structures on the LSI-R, it is appropriate to explore the factor structure of the LS/CMI at the item level to determine whether the previously identified factor structures are supported in different offender populations.

Aims of Current Study

As stated previously, it is important to validate any assessment tool in the population in which it is intended to be used, in this instance the Tasmanian offender population. Girard and Wormith (2004) note the importance of periodic cross-validation, as well as updating test items, due to ever-changing laws, legal terms, and offender populations. Further, there is a concern regarding the transferability of the Level of Service Inventories norms across jurisdictions (Schlager & Simourd, 2007). As a result, the present study aims to examine the factor structure of the LS/CMI using Australian offenders who are currently completing community-based orders. It could be expected that the identified factor model will be similar to that identified in Canadian/American offenders (i.e., a two-to-three factor model), or that the factor structure may be more diverse to represent the central eight factors that the LS/CMI encompasses. The internal reliability of the LS/CMI (using Cronbach's alpha) will be assessed and any changes (for example, the removal of items) to the LS/CMI will be examined. Lastly, the predictive utility of the LS/CMI will be examined using logistic regression and ROC analyses.

Method

Participants and Procedure

The current sample was obtained from a random selection of participants from study one. As identified in study one, Indigenous offenders were excluded due to their low representation within the sample. The current sample consisted of 302 participants, with 254 males (84%) and 48 females (16%). The mean age of the sample was 31 years (*SD* = 10, range: 18-67 years). Of this sample, 81% of participants were completing a community-based order, 1% were completing a custodial and parole sentence, and 18% were completing a combined custodial sentence and community-based order.

In regard to previous criminal history, 52.3% of the sample had prior offences, 39% had previously served a custodial sentence, and 52% had previously completed a community corrections order. A total of 64 participants, or 21% of the sample, reoffended within a 12 month period.

For the purposes of this study, data was retrieved from the Offender Information System database, which is the Community Corrections database within one Australian jurisdiction (Tasmania). The criteria for inclusion of individuals' data in the analysis included those who had been sentenced for an offence in 2010, had completed a LS/CMI assessment, and were completing either a community-based order or a custodial sentence combined with a supervision period upon release (either at the end of serving a custodial sentence or on parole). The information retrieved from the database included demographic information regarding the offender, their previous and current offending information (including any court results), information regarding their current community order completion, as well as any non-technical breaches that had occurred while completing their current orders.

Measures

LS/CMI. A full description of the LS/CMI can be located in chapter 2, page 63. The LS/CMI was completed by probation staff at the Tasmanian Department of Justice and Community Corrections. The staff had completed Multi-Health Systems (MHS) approved training, and/or were being supervised by a manager who had obtained this training and had completed the relevant educational qualifications. The Department of Justice also completed ongoing quality assurance procedures to ensure that the LS/CMI is being administered and scored according to the manual guidelines. The majority of LS/CMI assessments were completed as part of the pre-sentence report. Where a pre-sentence report was unable to be completed, the LS/CMI was completed within the first few months of the offenders' order. Inter-rater reliability was not available. Some items are scored on a dichotomous basis either scoring "yes" or "no," whereas some items are scored on a scale of 0 to 3. For consistency in analysing the data, items scored on a scale were recoded so that scores of two and three were recoded to represent "no", or the item is not present, whereas scores of zero and one were recoded to represent "yes", or the item is present. This method of recoding also corresponds and is consistent with the LS/CMI scoring proforma.

Reoffending. Because of variances in the length of probation/ supervision, reoffending for the purposes of this study was defined as a reoffence (a formal conviction of an offence) that occurred within 12 months of the index offence, for which the offender was convicted in 2010. For offenders who received a custodial sentence, data was collected from the date they were released into the community. This ensured that there was boundary limits around the length of the sentence and that all offenders' reoffending data was for the same time period, that is; 12 months (Ringland, 2011a; Watkins, 2011).

Design and Analysis

In order to examine the psychometric properties of the LS/CMI, a number of analyses were performed. These included internal consistency using Cronbach's alpha coefficients, concurrent validity with age and indices of criminal history and reoffending, and a factor analysis of the scales. In the reconviction analysis, sequential logistic regression was used as it allows variables known to be related to the outcome variable (reoffending) to be controlled. Therefore, the relationship between other variables with reoffending could be examined independently (Tabachnick & Fidell, 2007). A ROC analysis was also conducted to confirm the predictive utility of the LS/CMI.

Results

Group Means and Comparison with the Sample Group

The means and standard deviations for both the current sample and the North American total community sample normative group presented in the LS/CMI manual are presented in Table 11. *T*-tests were conducted to determine if there were significant differences between these two groups. The significantly higher mean scores are marked with an asterisk in Table 11. As can be seen, the Tasmanian offenders scored significantly higher on the LS/CMI total score, and the Criminal History, Leisure/Recreation, Companions, and the Alcohol/Drug Problem subscales. The North American normative group scored significantly higher on the Procriminal Attitude/Orientation subscale.

Table 11

Means and Standard Deviations, and Group Differences between the Current Sample and the LS/CMI North American Normative Group (Total Community Sample)

Scale	Current sample (N = 302)		North American Group (N = 39,536)	
	M	*SD*	*M*	*SD*
Criminal History	4.49	(1.72)**	3.12	(2.45)
Education/Employment	4.05	(2.73)	3.78	(2.80)
Family/Marital	1.60	(1.19)	1.60	(1.24)
Leisure/Recreation	1.33	(0.71)*	1.24	(0.79)
Companions	1.81	(1.35)**	1.53	(1.24)
Alcohol/Drug Problem	4.13	(2.11)**	2.96	(2.61)
Procriminal Attitude/ Orientation	0.89	(1.22)	1.33	(1.48)**
Antisocial Pattern	1.16	(1.13)	1.18	(1.22)
Total Score	19.44	(7.95)**	16.72	(10.11)

*p < .05. **p < .001.

Internal Reliability of the LS/CMI

Cronbach's alpha is a statistical measure of the internal consistency of a psychometric test. Coefficients of .6 to .7 are considered “acceptable”, .7 to .9 are considered to be “good”, and scores higher than 0.9 are considered to be “excellent”. Coefficients below 0.6 are considered to be “poor” or at a random level of chance (DeVellis, 2012). However, Nunnally (1978) asserts that instruments used in basic research should have a reliability of .70 or better, whereas for instruments used in applied settings a reliability of .80 may not be sufficient. Rather, where important decisions regarding the fate of an individual is made on the basis of test scores, reliability should be at least .90, preferably .95, or above. As can be seen in Table 12, the subscale and total scores of the LS/CMI ranged from .418 to .924, which falls below Nunnally’s recommendations.

Table 12

Internal Consistency of the Level of Service/ Case Management Inventory

Subscale	Number of Items	Alpha Coefficient	95% CI	Descriptive
Criminal History	8	.652	.590 - .709	Acceptable
Education/Employment	9	.828	.797 - .856	Good
Family/Marital	4	.439	.329 - .536	Unacceptable
Leisure/Recreation	2	.418	.270 - .536	Unacceptable
Companions	4	.696	.636 - .748	Acceptable
Alcohol/Drug Problem	8	.753	.709 - .793	Good
Procriminal Attitude/Orientation	4	.747	.697 - .790	Good
Antisocial Pattern	4	.587	.505 - .658	Poor
LS/CMI Total	43	.897	.880 - .913	Excellent

At an item-level, the alpha coefficient for all 43 items was .897. The item-total correlation table indicated that 12 items from the LS/CMI obtained a correlation value of less than 0.3. Items related to youth and adult convictions (items 1, 2, 3, 4) were, having less than grade twelve education (item 13), an offender being dissatisfied with their marital (or equivalent) situation (item 18), having a family member or spouse with a criminal record (item 21), not being involved in an organised activity/hobby (item 22), past and present history of an alcohol problem (items 28 and 30), having a poor attitude toward their sentence and/or offence (item 38), and a specialised assessment for antisocial pattern has been completed (item 40). This indicates that these items did not correlate well with the overall scale and may be dropped from the scale. With these items removed, a Cronbach's alpha of .91 was obtained, indicating an excellent level of internal reliability.

Correlations

The direction, magnitude and significance of the correlations can be viewed in Table 13. As can be seen, the inter-scale correlations were all highly significant, with the majority significant at the p <.001 level. The exception to this was the correlation between the Criminal History and Leisure/Recreation subscales. A number of significant negative correlations were found between age and scores for the following LS/CMI subscales: Education/ Employment, Companions, Alcohol/Drug Problem, Procriminal Attitude/ Orientation, and Antisocial Pattern. There was also a significant and inverse relationship between age and the LS/CMI total score, p <.001. Pearson correlations were calculated between age, the LS/CMI scores and whether offenders had been found guilty of prior offences. All correlations were significant at least at the p <.05 level, with the exception of the Alcohol/Drug Problem and Procriminal Attitude/ Orientation subscales. Whether an offender reoffended within a 12-month period was significantly correlated with the Education/Employment, Leisure/Recreation, Alcohol/Drug Problem, Procriminal Attitude/Orientation, and Antisocial Pattern subscales, the LS/CMI total score, and age of the offender.

Table 13

Correlations Between Offenders' Age, LS/CMI Total and Subscale Scores, Prior Offences History, and Reoffending

Subscales	CH	EE	FM	LR	C	ADP	POA	AP	Total LS/CMI	Age	Prior Offences	Re-Offend
CH	1	.265***	.206***	.075	.359***	.200***	.241***	.451***	.568***	.089	.501***	.026
EE		1	.300***	.405***	.459***	.307***	.278***	.483***	.750***	-.260***	.179**	.182**
FM			1	.125*	.307***	.268***	.261***	.366***	.514***	.017	.145*	.046
LR				1	.432***	.256***	.161**	.295***	.464***	-.049	.122*	.120*
C					1	.407***	.386***	.549***	.731***	-.150**	.168**	.057
ADP						1	.286***	.418***	.641***	-.146*	.093	.121*
POA							1	.615***	.587***	-.136*	.099	.152**
AP								1	.789***	-.150**	.156**	.166**
Total									1	-.172**	.298***	.171**
Age										1	.241***	-.287***
Prior Offences											1	-.006
Re-Offend												1

Note. CH=Criminal History, EE= Education/Employment, FM= Family/Marital, LR= Leisure/Recreation, C= Companions, ADP = Alcohol/Drug Problem, POA= Procriminal Orientation/Attitude, AP= Antisocial Pattern

* *p* <.05. ** *p* <.01. *** *p* <.001.

Factor Analysis

Factor analyses at both the subscale and item level were undertaken using a principal axis factor analysis with direct oblimin rotation. This method was chosen to explore the underlying latent constructs of the LS/CMI. An orthogonal rotation method (direct oblimin) was used as the derived factors are likely to be intercorrelated. For a factor to be considered for inclusion, an eigenvalue of >1 was used as the minimum threshold value. This was also confirmed through a visual inspection of the scree plot. Consistent with the general rule of thumb, only variables with loadings of .32 and above were interpreted as they account for 10% of overlapping variance (Tabachnick & Fidell, 2007). The degree of item cross-loadings across factors (if present) was also considered.

Subscale level. To replicate the factor analysis reported by previous research (Loza & Simourd, 1994; Hollin et al., 2003; Palmer & Hollin, 2007), the LS/CMI subscale scores were examined. The Kaiser-Meyer Olkin measure of sampling adequacy was .82, above the recommended value of .6, and Barlett's test of sphericity was significant (χ^2 (28) = 650, p < .001). This suggested that the data set was suitable for exploratory factor analysis. The analysis produced a two-factor solution where factors one and two accounted for 42% (eigenvalue = 3.38) and 13% (eigenvalue = 1.04) of the variance respectively. The loadings of each of the subscales across the two factors can be viewed in Table 14. It is noted that two subscales loaded almost equally on both factors. This included the Education/Employment subscale (.330 and .413 respectively), and the Companions subscale (.454 and .405 respectively). Factor one represents the subscales relating to criminal conduct and the second factor relates to lifestyle factors. These two factors were determined to be moderately correlated (r = .5).

Table 14

Factor Loadings of the LS/CMI Subscales across the Two Factor Model

Subscale	Factor 1	Factor 2
Criminal History	.504	
Education/Employment	.330	.413
Family/Marital	.410	
Leisure/Recreation		.746
Companions	.454	.405
Alcohol/Drug Problem	.376	
Procriminal Attitude/Orientation	.661	
Antisocial Pattern	.925	

Item level. The data was screened for univariate outliers and no problematic values were identified. Initially, the factorability of the 43 LS/CMI items was examined. The Kaiser-Meyer Olkin measure of sampling adequacy was .85, above the recommended value of .6, and Barlett's test of sphericity was significant (χ^2 (903) = 6150, p < .001). This suggested that the data set was suitable for the factor analysis.

A 12 factor solution explaining 65% of the variance was selected and confirmed through a visual inspection of the scree plot which indicated a levelling off of eigenvalues after 12 factors (see Figure 3). Initial eigenvalues indicated that the first factor explained 22% of the variance and had an eigenvalue of 9.3. Factors two, three and four had eigenvalues of two and explained 6.8%, 6.2% and 5% of the variance respectively. Factors five to 12 had eigenvalues of one and explained between 2% to 4% of the variance. As the LS/CMI is copy-righted and cannot be reproduced, the items loading on each of these factors appear under their original subscales in Table 15. Please refer to the LS/CMI manual for the full item content. These factors have been labelled to reflect the items within each identified factor. As only items with loadings of .32 were considered, seven items did not load onto any of the factors (items 4, 11, 14, 21, 22, 29, and 40). All of the factors appeared to be unidimensional with no cross-loadings present.

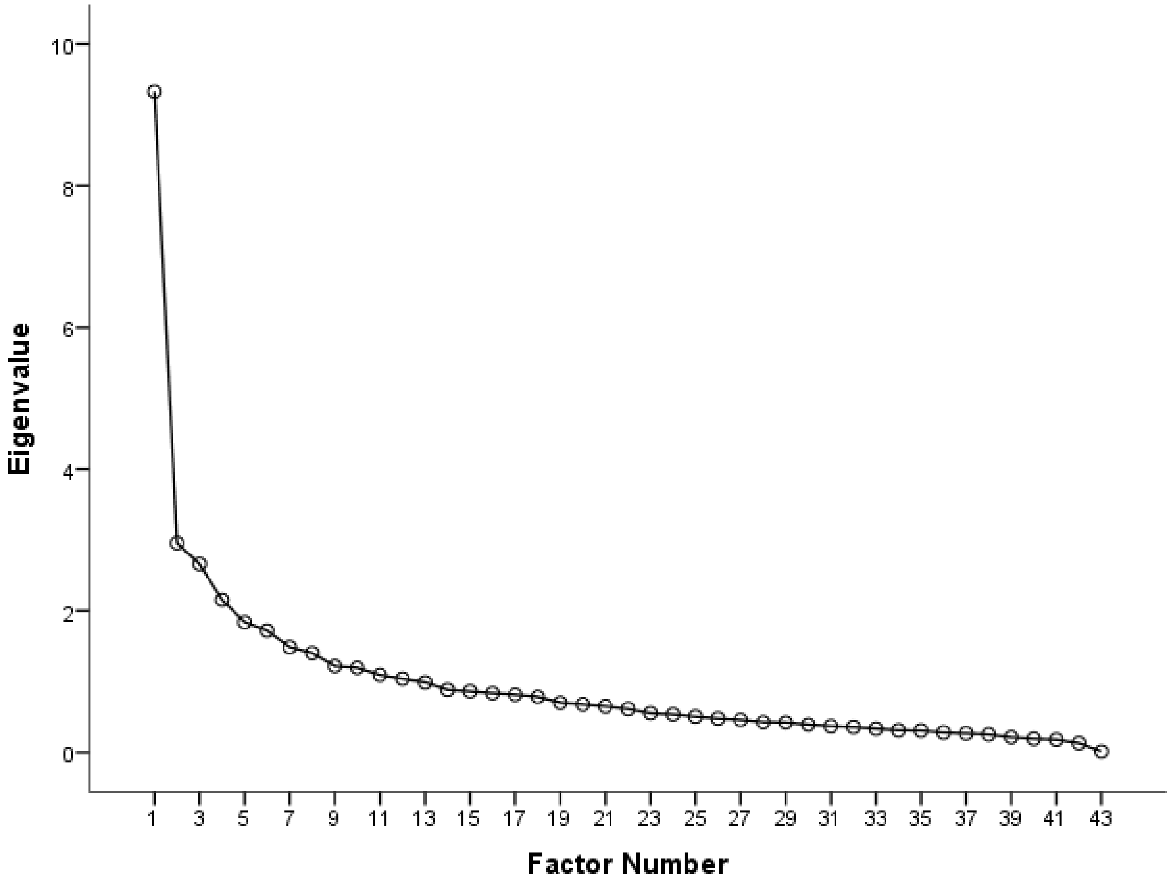

Figure 3. Scree plot indicating a twelve factor solution at an item-level for the LS/CMI.

Table 15

Factor Structure of the Level of Service/ Case Management Inventory

Factor	Item	LS/CMI Subscale Item Refers To	Loading
Factor One: Current Drug Problem, Impact of Drug Problem & Pattern of Generalised Trouble	31	Alcohol/Drug Problem	.471
	33	Family/Marital (Alcohol/Drug Problem)	.648
	34	Education/Employment (Alcohol/Drug Problem)	.469
	35	Alcohol/Drug Problem	.561
	43	Antisocial Pattern	.337
Factor Two: Employment & Use of Time	9	Education/Employment	-.849
	10	Education/Employment	-.516
	15	Education/Employment	-.861
	16	Education/Employment	-.980
	17	Education/Employment	-.987
	23	Leisure/Recreation	-.353
Factor Three: Alcohol Problem	28	Alcohol/Drug Problem	-.595
	30	Alcohol/Drug Problem	-.798
	32	Alcohol/Drug Problem	-.467
Factor Four: Procriminal Attitude/Orientation	36	Procriminal Attitude/Orientation	-.730
	37	Procriminal Attitude/Orientation	-.678
	38	Procriminal Attitude/Orientation	-.592
	39	Procriminal Attitude/Orientation	-.629
Factor Five: Previous Convictions	1	Criminal History	.493
	2	Criminal History	.908
	3	Criminal History	.679
Factor Six: Family/Relatives	19	Family/Marital	-.868
	20	Family/Marital	-.600
Factor Seven: Early & Diverse Antisocial Behaviour	5	Criminal History	.736
	41	Antisocial Pattern	.963
Factor Eight: Incarceration & Offending on Orders	6	Criminal History	-.736
	7	Criminal History	-.412
	8	Criminal History	-.491
Factor Nine: Criminal Associates & History of Drug Problem	24	Companions	.625
	25	Companions	.517
Factor Ten: Few Anticriminal Associates	26	Companions	.653
	27	Companions	.649
Factor Eleven: Marital	18	Family/Marital	-.496
Factor Twelve: Education	12	Education/Employment	.442
	13	Education/Employment	.518

A total of 12 items did not correlate well with the overall scale (values of < 0.3 on item-total correlation). Therefore, these items were removed and the remaining items were re-analysed (31 of the original 43 LS/CMI items). The Kaiser-Meyer Olkin measure of sampling adequacy was .87, above the recommended value of .6, and Barlett's test of sphericity was significant (χ^2 (496) = 5177, p < .001). This suggested that the data set was suitable for exploratory factor analysis.

An eight factor solution explained 65% of the variance and was selected and confirmed through a visual inspection of the scree plot which indicated a levelling off of eigenvalues after eight factors (see Figure 4).

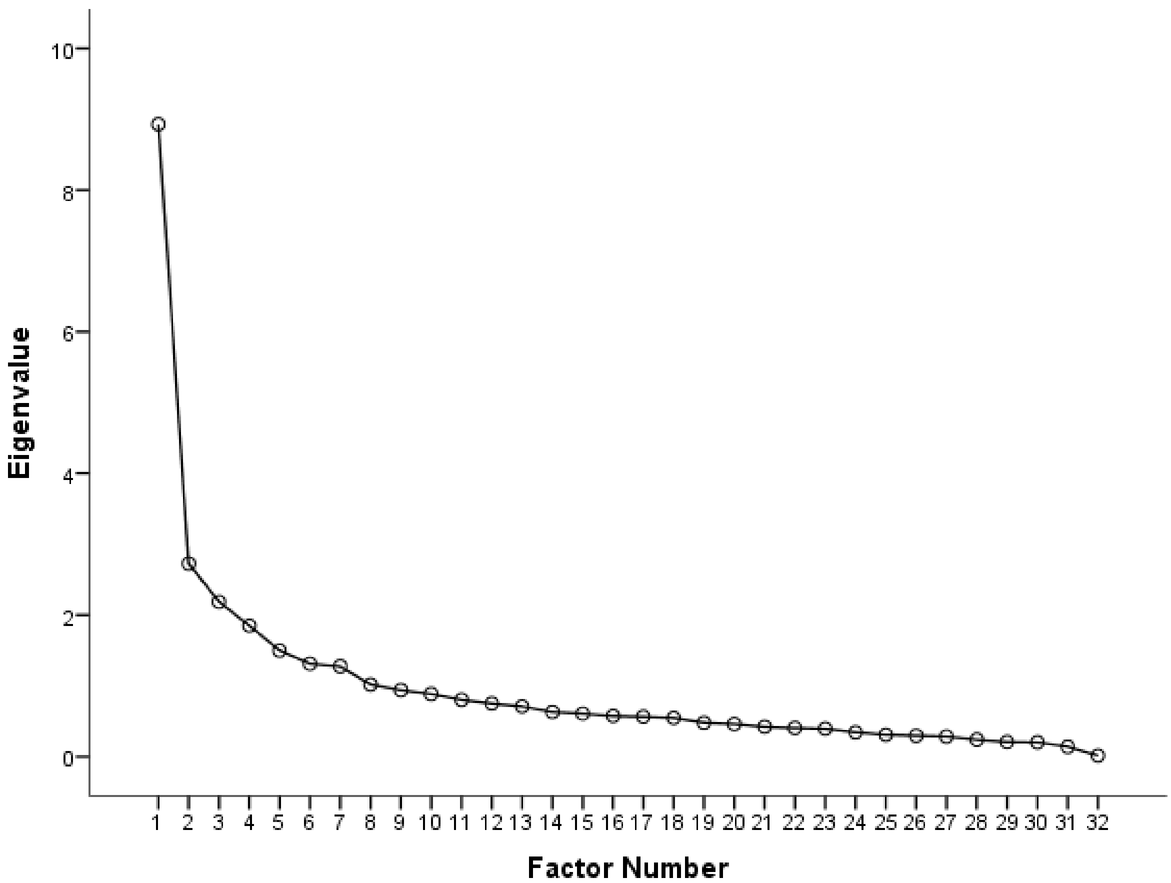

Figure 4. Scree plot indicating a twelve factor solution at an item-level for the LS/CMI, with 12 items removed.

Initial eigenvalues indicated that the first factor explained 28% of the variance and had an eigenvalue of 8.9. Factors two and three had eigenvalues of two and explained 8.5% and 6.8% of the variance respectively. Factors four to eight had eigenvalues of one and explained between 3% to 6% of the variance. As the LS/CMI is copy-righted and cannot be reproduced, the items loading on each of these factors appear under their original subscales in Table 16. These factors have also been labelled to reflect the items within each identified factor. These factors are: Procriminal Attitude/Orientation, Employment and Use of Time, Early and/or Diverse Antisocial Behaviour, Impact of Drug/Alcohol Problems, Parent/Relatives, Criminal Acquaintances and Drug Problem, Incarceration and Breach of Orders, and Few Anticriminal Associates. As only items with loadings of .32 were considered, item 23 did not load onto any factor. All of the factors appeared to be unidimensional with no cross-loadings present.

Table 16

Factor Structure of the Level of Service/ Case Management Inventory with 12 Items Removed

Factor	Item	LS/CMI Subscale Item Refers To	Loading
Factor One: Procriminal Attitude/Orientation	36	Procriminal Attitude/Orientation	.730
	37	Procriminal Attitude/Orientation	.644
	38	Procriminal Attitude/Orientation	.583
	39	Procriminal Attitude/Orientation	.620
	42	Antisocial Pattern	.725
Factor Two: Employment and Use of Time	9	Education/Employment	-.834
	10	Education/Employment	-.507
	15	Education/Employment	-.821
	16	Education/Employment	-.983
	17	Education/Employment	-.998
Factor Three: Early and/or Diverse Antisocial Behaviour	5	Criminal History	.715
	11	Education/Employment	.400
	12	Education/Employment	.322
	14	Education/Employment	.458
	41	Antisocial Pattern	.691
	43	Antisocial Pattern	.429
Factor Four: Impact of Drug/ Alcohol Problems	31	Alcohol/Drug Problem	.401
	32	Alcohol/Drug Problem	.639
	33	Family/Marital (Alcohol/Drug Problem)	.741
	34	Education/Employment (Alcohol/Drug Problem)	.548
	35	Alcohol/Drug Problem	.470
Factor Five: Parent/Relatives	19	Family/Marital	.837
	20	Family/Marital	.624
Factor Six: Criminal Acquaintances and Drug Problem	24	Companions	-.699
	25	Companions	-.609
	29	Alcohol/Drug Problem	-.379
	31	Alcohol/Drug Problem	-.466
Factor Seven: Incarceration and Breach of Orders	6	Criminal History	.729
	7	Criminal History	.454
	8	Criminal History	.527
Factor Eight: Few Anticriminal Associates	26	Companions	-.728
	27	Companions	-.805

Sequential Logistic Regression

A sequential logistic regression was used in order to investigate the predictive utility of the LS/CMI. Due to the number of items removed for the revised total score, only the total score and revised total score analyses are reported here, as opposed to analyses of the predictive validity of the subscales. This is due to the subscale totals becoming questionable as they only relied on one item for a total score. In each analysis, the control variable of age was entered in first. Age was used as a control variable as it has been found to be a predictor of reoffending (for example, Lowenkamp et al., 2001; Hollin & Palmer, 2006; Holsinger et al., 2006; Hsu, 2010). The beta coefficients and effect sizes (Expβ) for the models predicting reoffending for both the LS/CMI total score and the revised total score are displayed in Table 17. In the first analysis, the LS/CMI total score was then added in the second step of the model. The overall successful classification rate for the logistic regression model based on age and LS/CMI total score was 78.7%. The model successfully predicted outcomes for the 6% of the 64 offenders who reoffended, and 99% of the offenders who did not reoffend.

Next, the 12 items with low item-total correlations previously identified were removed from the data and the LS/CMI total score was recalculated. The previous sequential logistic regression was re-run, replacing the LS/CMI score with the new revised total score. The overall successful classification rate for the logistic regression model based on age and the revised LS/CMI Total score was 79.4%. The model successfully predicted outcomes for the 17% of the 64 offenders who did reoffend, and 96% of the offenders who did not reoffend.

Table 17

LS/CMI Total Score as a Predictor of Reoffending

	B	SE of β	Wald's Chi-Square	*p*-value	Exp(β)	95% CI of Exp(β)
LS/CMI Total score						
Age	-.093	.021	20.09	<.001	.912	.875 - .949
Total Score	.042	.019	5.07	.024	1.04	1.00 - 1.08
Revised LS/CMI Total Score						
Age	-.089	.021	17.70	<.001	.915	.878 - .954
Total Score	.079	.021	14.35	<.001	1.08	1.04 - 1.13

The results indicate that an increase in the LS/CMI total and revised total score is associated with a greater likelihood of reoffending after controlling for the effects of age; however this is a relatively weak effect size. This means that for each one unit increase in the LS/CMI total and revised total score, the chances of recidivism increases by .04 and .08 respectively. That is; the odds ratios indicated individuals who are identified as being of a higher risk of reoffending are .04 (LS/CMI total score) and .08 (LS/CMI revised score) are more likely to reoffend than those individuals identified as having a lower recidivism risk. Sequential logistic regression analyses were also conducted removing the control variable of age to determine if the predictive validity was affected when age was removed from the model. The changes to the Expβ value was minimal for both the LS/CMI total (Expβ = 1.05) and the revised LS/CMI total (Expβ = 1.10), but in both instances it was an improvement on predicting recidivism by age of the offender only.

Receiver Operator Characteristic (ROC) analysis

This section investigates the validity of the LS/CMI in predicting reoffending using the receiver operator characteristic (ROC) analysis. This procedure produces a ROC curve where true positive rates are plotted against false positive rates in order to display a trade-off between sensitivity, or those offenders who are correctly identified as being of at risk of reoffending and actually reoffend, and specificity, which are those offenders who are correctly classified as being of low risk of reoffending and do not reoffend (Metz, 2006).

The AUC for the LS/CMI Total score was significant at the p <.05 level (AUC = .621, 95% CI [.546, .696]). The AUC for the revised LS/CMI total score was significant at the p <.001 (AUC = .693, 95% CI [.625, .762]). However, in both instances the AUC value suggests only a weak predictive validity. In relation to the magnitudes of the ROC values, following guidelines provided by Rice and Harris (2005) in both instances these values would reflect a medium effect size (Cohen's d = .4 and .7 respectively).

Discussion

This study provides information regarding the psychometric properties of the Level of Service/Case Management Inventory in an Australian (Tasmanian) offender population. Specifically, this study examined the internal consistency of the LS/CMI scale, criminogenic risk and need in the current sample, the factor structure of the LS/CMI at both a subscale and item level, and the predictive utility of the LS/CMI using both the General Risk/Need total score and a revised total score. The implications of each of these findings in terms of the LS/CMI's psychometric properties are discussed in turn.

Group Means and the Internal Consistency of the LS/CMI

An analysis of the current sample’s mean scores on the LS/CMI total and subscales scores indicated that there were significant differences when compared with the North American total community sample normative group presented in the LS/CMI manual. Specifically, the current offenders scored significantly higher on the LS/CMI total score, and the Criminal History, Leisure/Recreation, Companions, and the Alcohol/Drug Problem subscales. This raises concern over the appropriateness of utilising the Canadian norms to classify Australian offenders' recidivism risk. It is suggested that more research needs to be conducted in order to gain Australian normative data to apply to this risk assessment.

Regarding the internal consistency of the LS/CMI, the alpha coefficients determined that the General Risk/Need total score had an excellent level of internal consistency ($\alpha = 0.9$). However, at a subscale level, there was variability in terms of internal consistency, with subscale coefficient alpha's ranging from .42 to .83. This indicated that five of the eight scales achieved an acceptable or higher level of internal consistency, while three of the scales were poor or unacceptable. The variation in the alpha coefficients are comparable to those obtained by Hollin et al. (2003) and Palmer and Hollin (2007), who assert this may be due to the varying number of items across the subscales with some subscales having fewer items than others (for example, two items on the Leisure and Recreation subscale compared with eight items on the Criminal History subscale). However, correctional agencies use these scales to identify an offender's criminogenic risk and need (including strengths), as well as to incorporate these scales into sentence, program and release-based planning. Basing such decisions on scales that have poor internal consistency is problematic as the results of the assessment may not be repeatable or consistent. If an assessment is not psychometrically reliable it can result in inaccurate decisions with the potential for serious consequences. Cronbach's alpha is used as an estimate of the reliability of a psychometric test. DeVellis (2012) suggests Cronbach's alpha ranges of .7 and above for practical uses. This is important for risk assessments when agencies are basing release decisions, supervision and intervention strategies upon them. Therefore, the capacity for the subscales to function as independent scales to adequately identify criminogenic risk/needs is questionable and requires further research.

Identified Problematic Items

The item-total correlation table identified that 12 of the 43 LS/CMI items (28% of the items) did not have a high correlation with the overall scale and could be excluded from the scale. Of the items that were excluded, five of these items could be considered double-barrelled items in which the item addressed two questions; for example, the item asked about both youth and adult criminal history. This suggests that these items may need to be separated to be adequately measured in this sample of offenders. This information could determine if youth and/or adult offending contributes more to future recidivism within this population. Further, the items addressing the presence of an alcohol problem (previously and currently) were also identified as not having a high correlation with the overall LS/CMI scale. This is an unusual finding considering the link between alcohol and crime, for example, being under the influence of alcohol when committing the offence (Greenfeld & Henneberg, 2001), and should be an area for future research regarding the prevalence and implications of alcohol problems and its relationship with criminal behaviour within this population. Having less than grade 12 education, but not less than grade 10, was identified as having a low correlation with the overall scale. However, due to the current low Tasmanian retention rates beyond a grade 10 education, this may be a finding specific to the current sample wherein more than a grade 10 level of education is considered a strength. The item pertaining to a specialised assessment for antisocial pattern (where Antisocial Personality Disorder is formally diagnosed) was also identified as not having a high correlation with the overall scale. This may have arisen due to the sample size wherein the item could not be measured efficiently, rather than an implication of the item itself. The remaining identified items could be seen as asking a lot of information for one item, whereas it could be suggested that in this sample the items may need to be broken down into several items in order to capture the true attitude or circumstance of the offender, and should be further investigated to see if these items become less problematic resulting in an increase in predictive validity. However, identifying 28% of the LS/CMI items as not correlating with the overall scale suggested that the LS/CMI may not be adequate for the Tasmanian offender sample. This may require further research on the LS/CMI and/or attempting to develop a revised or new risk assessment that explores the impact of separating out identified problematic items to determine whether the issues are present and how they can be measured in a more effective manner in order to improve the identification of criminogenic needs and their predictive utility.

Correlations

The LS/CMI total and subscale scores (with the exception of the Alcohol/Drug Problem and Procriminal Attitude/Orientation subscales) were strongly associated with criminal history in regard to whether or not the offender had been guilty of prior offences. This finding is not surprising given that the higher the LS/CMI score an individual obtains, the higher the offenders' recidivism risk. Further, from the current sample over half (52%) had a previous conviction, 39% had previously served a custodial sentence, and 21% had reoffended within 12 months of their current conviction. While this rate of prior offences and recidivism may seem high, statistics collected by the AIC (2013) indicated that of prisoners released in 2008-9, 40% had returned to prison under sentence, with a total of 46% of offenders returning to corrective services (both prison and community corrections) by the end of the 2011 financial period, reflecting the rate of reoffending within Australia.

Factor Structure of the LS/CMI

The results of the factor analyses were consistent with previous studies (e.g., Loza & Simourd, 1994; Hollin et al., 2003). At a subscale level the LS/CMI produced a two-factor solution with the factors accounting for 42% and 13% of the variance respectively. Three of the subscales (Education/Employment, Companions, and Alcohol/Drug Problem) loaded almost equally across the two factors. The subscales loading onto the first factor represents the majority of the central eight factors relating to criminal conduct. The second factor represents those areas relating to lifestyle considerations (or the moderate four factors of the central eight). These items are important considerations that can be targeted through supervision and/or program interventions.

At an item level, a 12 factor solution was produced when all 43 LS/CMI items were included in a factor analysis. The 12 factors were labelled: Current Drug Problem, Impact of Dug Problem, and Pattern of Generalised Trouble; Employment and Use of Time; Alcohol Problem; Procriminal Attitude/Orientation; Previous Convictions; Family/Relatives; Early and Diverse Antisocial Behaviour; Incarcerations and Offending on Orders; Criminal Associates and History of Drug Problem; Few Anticriminal Associates; Marital; and Education. This is in contrast to the findings of Hsu et al. (2011) who determined a five factor solution for Australian males (Static Risk, Employment, Procriminal Attitudes, Mental Health, and Protective Companions), and a four factor solution for Australian females (Static Risk, Employment, Procriminal Attitudes, and Mental Health), when investigating the psychometric properties of the LSI-R. However, it is important to note that the current study did not examine the factor structure for males and females separately due to the size of the sample. This could be why a differing factor structure was determined for this sample. Whilst recidivism assessments tend to be validated on predominantly white offender populations, it is argued that the Level of Service Inventories are gender-neutral (Andrews & Bonta, 2010). However, research indicates that whilst the predictive validity is not affected because these instruments are gender-neutral, female offenders are identified as having differing risk/need factors that may be gender-specific (for example, Rettinger & Andrews, 2010), and as a consequence, this may have skewed the results of the current factor analysis.

It can be considered an usual finding that criminal history did not load onto the first factor of the factor structure of the LS/CMI as it has done in previous studies (e.g., Hsu et al., 2011). Rather, for this population of offenders, items relating to a current drug problem, its impact on several areas of functioning, and whether the offender displays a pattern of early and diverse antisocial behaviours loaded highly on the first factor. Items relating to an offender's past and present alcohol problem and law violations loaded onto the third factor. This suggests that criminality and alcohol and drug use in offenders are areas of importance for this sample of offenders. While the relationship between alcohol abuse and criminal behaviour is weaker in comparison to that between illicit drugs and crime, and the criminal justice system is less tolerant of illicit substance abuse in comparison to alcohol abuse (Andrews & Bonta, 2010), they are both important considerations when determining an offender's risk of recidivism. Alcohol abuse among offenders is quite high and offenders often report a high incidence of drinking at the time the offence occurred (Greenfeld & Henneberg, 2001). It can be argued that illicit drug use/abuse has a stronger link to crime because of the illegal nature of the drugs and that they usually place an individual in direct contact with other criminals. The ABS (2005) determined that in 2004, 37% of detainees in the Drug Use Monitoring in Australia Program attributed at least some of their offending to their illicit drug use and/or to support drug habits. Due to these factors, substance abuse can play a critical role in an offender's management program so that targeting this area through effective intervention can help reduce an offender's risk of engaging in future criminal behaviour. Muftic and Bouffard (2008) suggest that an effective approach for substance abusing offenders is a combination of intensive supervision programs combined with substantive treatment components and that chemical dependency assessment and community service sentences offer benefits to both the offenders and the community that do not occur with monetary fines and should be considered especially for low-level drug and/or alcohol offenders.

The second factor related to items regarding employment and frequency of employment, as well as the offenders' use of time. Employment may also be an important consideration for Tasmanian offenders in light of the current economic climate. The current unemployment rate in Australia stands at 5.8% in August 2013, which has increased by 0.1% from July 2013. In Tasmania specifically, where this data was collected, Tasmania has the highest unemployment rate in Australia of 8.6%, increasing by 0.2% from previously estimated figures (ABS, 2013). It remains a challenge within the population to find adequate stable and permanent employment in order to meet an individual's financial needs. Andrews and Bonta (2010) indicate that stability of unemployment is a stronger risk factor than unemployment itself, with criminal behaviour increasing with frequent unemployment and longer durations of being unemployed.

It was not until the fourth factor that the big four of the central eight factors appeared. Items on this factor related to an offenders' procriminal attitude and orientation, or whether he/she was supportive towards crime and felt that his/her sentence or order was fair. Antisocial attitudes and cognitions are considered to be one of the best predictors of future criminal recidivism (Andrews & Bonta, 2010). As it is considered to be a dynamic factor, antisocial attitudes and cognitions can be addressed through targeted interventions and supervision through the reduction of antisocial thinking and gaining insight on risky thoughts and behaviours. Further, the offender can be encouraged to build and maintain social connections with anticriminal friends and associates for positive reinforcement of prosocial behaviours and attitudes to reduce recidivism risk.

While the identified twelve factor solution does reflect the central eight factors identified by Andrews and Bonta (2010), the factors are reflected in a differing order of importance. Andrews and Bonta (1995) have acknowledged that the factor structure of the LSI-R may depend upon the population and setting in which it is administered due to inconsistent factor structures reported in various studies (e.g., Andrews & Robinson, 1984; Loza & Simourd, 1994; Hsu et al., 2011). From the analyses this appears to be true for the current sample of Tasmanian offenders. This is important as not only does it provide information regarding the latent construct structure of the LS/CMI, but it also suggests areas of concern within this offending population. Another consideration in regard to the differing factor solution is the impact of interventions that the current sample has received. The impact of, and relationship between, interventions and reoffending should be a consideration for further research in this sample of offenders. This could inform correctional justice agencies when developing programs and interventions in order to respond to these identified needs.

Predictive Utility of the LS/CMI

In both sequential logistic regression analyses, the total and revised total scores were found to be predictive of criminal reoffending within a 12 month period. When the previously identified 12 LS/CMI items were removed for the subsequent analysis, the overall successful classification rate improved marginally by 0.7%. However, there was an improvement in the predicted outcomes of offenders who did reoffend, with the total score identifying 6% and the revised total score identifying 17% of the 64 offenders who did reoffend. Despite this improvement, for both the total and revised total scores, there was a relatively weak effect size suggesting that the instrument needs to be more sensitive to the criminogenic risk/needs within this population. This analysis indicates that the LS/CMI only accounts for a small amount of variance that is associated with recidivism, and successfully predicting 17% of offenders who did not reoffend even when the identified twelve items were removed is poor. This low predictive validity of both the LS/CMI total score and the revised score was confirmed by the ROC analyses. In both instances, the predictive utility, although significant, was relatively weak (AUC = .62 and AUC = .63 respectively). Further, the AUC values obtained in the current research were lower than that obtained in Guay (2012) in regard to predicting new arrests for both gang (AUC = .71) and non-gang (AUC = .73) in Canadian offenders. The current AUC values were also lower than that obtained by Girard and Wormith (2004) when evaluating the LSI-OR. This indicates that using the LS/CMI as a measure of recidivism risk is problematic within this population of Tasmanian offenders. While it is acknowledged that risk assessments do not predict whether an offender will reoffend, they are used to provide a structured statistical assessment of identifying an individual's level of recidivism risk, which in turn can inform an offender's sentence, intensity of supervision, and eligibility for programs aimed at reducing recidivism risk for identified criminogenic needs. The current findings question the use of the LS/CMI in doing this, and suggest that further research is required in order to validate the instrument in the current population, or revise or tailor the current instrument to suit the needs of the population and improve its predictive utility.

Limitations

Several limitations in the current study were identified. In the current study the data for females and males were combined due to the small sample size. While it is argued that the Level of Service Inventories are gender-neutral, other research finds that females have different criminogenic risk/needs which may have impacted upon the results (Hannah-Moffatt, 2006; 2009). Data pertaining to interventions that offenders had completed was not collected due to logistical reasons. It is suggested that future research obtains data regarding whether an offender has been involved in, and completed, an intervention program, and what intervention program was completed, to determine if this affects the predictive validity of the LS/CMI. Further, the data was obtained from a community corrections agency limiting the diversity of the sample, as well as possibly the seriousness of the offences as opposed to, for example, a data sample that included prisoners. As a result, it is suggested that further research is conducted that examines the norms, factor structure, and predictive utility of the

LS/CMI as it applies to female and Indigenous offenders, differing risk levels, as well as exploring whether the LS/CMI is predictive of both general and violent recidivism. In using a factor analysis, the purpose of the presented research included exploring the underlying latent constructs of the LS/CMI using an exploratory factor analysis. It is suggested that this research could be further expanded by conducting a confirmatory factor analysis to explore the structure and relationships between the latent constructs that underlie the LS/CMI and this could be conducted with a larger sample size.

It is important that these limitations are considered and addressed in future research evaluating both the LS/CMI and other risk assessments. Using a risk assessment instrument that has not been adequately validated in the population it is intended to be used could disproportionately restrict their liberty due to an inaccurate assessment of their possible future behaviour or recidivism risk (Glazebrook, 2010). This can be avoided through further study of the assessments psychometric properties, and tailoring the instrument if necessary.

Conclusions

An assessment of an offender’s risk of recidivism is an integral part of his/her case planning within a corrective services environment. By identifying their overall level of risk, including criminogenic risk/needs, corrections personnel are able to develop effective case plans that specifically target areas of concern for the individual offender. The information gained from such risk assessments can also be used for policy decisions including whether to release an offender from custody, parole and probation conditions, and his/her potential eligibility for community corrections orders. In doing such assessments, it is important to use tests that have excellent empirical reliability and validity. This is to ensure the assessment measures what it intends to measure (that is, risk of reoffending), and that it does so in a reliable manner. Further, test administrators need to ensure that they adhere to the administration, scoring, and interpretation guidelines of the assessment, as well as ensuring that it is appropriate to use in the target population (Boyle, Saklofske, & Matthews, 2012).

The current study builds on and contributes to the work in criminological research pertaining to risk assessment instruments. Although studies in the international arena have examined the use and efficacy of the multiple Level of Service Inventories, there has not been an extended study of the Level of Service/Case Management Inventory within an Australian context to the best of the authors' knowledge. As such, this study provides insight into the risk, need, and responsivity issues of Australian offenders by examining the psychometric properties and use of the LS/CMI in an Australian offender community corrections population and reflects on considerations for the future use of such instruments. The findings from the current study indicate that while the LS/CMI had excellent internal reliability in terms of its overall risk/need score, three of the eight subscales achieved a poor or unacceptable level of internal reliability. In regard to the predictive utility of the LS/CMI, the results indicate that both the LS/CMI total and the revised total (12 items removed) scores were determined to have predictive accuracy for general recidivism, with a significant weak to medium effect size.

This has implications for current users of the LS/CMI who are using this assessment tool outside the Canadian context. Australian users of the LS/CMI need to be aware that at present the LS/CMI may not be the most effective means to measure risk without further validation of the instrument. Therefore, it is important for Australian corrective jurisdictions to validate this instrument within the intended offender population to provide valid norms for the LS/CMI. This is crucial as previous Australian research (e.g., Hsu, 2010; Mihailides et al., 2005) has identified concerns when transferring across the Canadian norms of previous Level of Service inventories. As a result, it is suggested that whilst the LS/CMI is predicting recidivism at a low level within this population, further investigation may be required to increase the predictive validity of the LS/CMI. Further research should be conducted before permanently adopting internationally-developed instruments within an Australian jurisdiction for the purposes of predicting recidivism risk and using this information to inform parole and community supervision orders.

4

Development and Preliminary Analyses of the Australian Risk/Need Inventory in an Australian Population[2]

[2] Unpublished manuscript

Study 3: Development and Preliminary Analyses of the Australian Risk/Need Inventory in an Australian Population

Study Overview

The aim of study three included amalgamating the information obtained from the previous two studies in order to develop a risk assessment to be piloted within the Tasmanian Department of Justice. This included identifying what items did not correlate or work well on the LS/CMI as well as separating some items and adding more items to explore criminal risk and needs. This instrument was piloted on offenders who were incarcerated or completing a community-based order. It was hypothesised that the general criminogenic risk factors (as identified by the RNR model) would be identified from the items composing the Australian Risk/Need Inventory (ARNI). Further, it was hypothesised that the total score and the subscale scores (identified through a factor analysis) would be predictive of general recidivism within a six-month timeframe.

The findings from this study indicated that from the original item pool, 45 items were identified to have high corrected item-total correlations and were retained in the final version of the ARNI. The Cronbach's alpha for the total score indicated an excellent level of internal reliability ($\alpha = .93$). At a subscale level, the internal reliability ranged from excellent ($\alpha = .92$; Frequency of Employment subscale) to acceptable ($\alpha = .62$; Antisocial Cognitions). Factor analysis identified a ten factor solution that reflected the central eight factors identified by Andrews et al. (1990). In regard to predictive utility, it was determined that the ARNI total score and five of the ten subscales were predictive of reoffending within a six-month time frame for the total sample ($N = 301$).

The preliminary results of the ARNI indicated that the ARNI total score demonstrates a fair predictive ability in discriminating between offenders who reoffend and those who do not reoffend within a six month period. Further, all of the ARNI subscales have an adequate, or higher, level of internal reliability. Half of the ARNI subscales also demonstrated a fair ability to discriminate between recidivists and non-recidivists. It is suggested that extending the sample size (including increasing the heterogeneity of the offender sample) and increasing the follow-up reoffending period may increase the predictive utility and sensitivity of the ARNI total and subscale scores in discriminating between lower- and higher-risk offenders. However, the results of this study, combined with the previous two studies examining the LS/CMI, suggest that in order to conduct a more in-depth risk assessment, specialised assessments (such as those addressing substance use and instrumental aggression) may also need to be conducted alongside the general risk assessment. This will provide the most comprehensive risk assessment process and will allow criminal justice agencies to utilise their limited resources efficiently and effectively. All analyses for this chapter can be located in Appendix C.

Development and Preliminary Analyses of the Australian Risk/Need Inventory in an Australian Population

Heidi Gordon, Sally F. Kelty, and Roberta Julian

Tasmanian Institute of Law Enforcement Studies (TILES), University of Tasmania, Hobart, Australia

Abstract

In the criminal justice arena, risk assessments aim to identify offenders' recidivism risk, particularly for high risk offenders, in order to tailor a supervision management plan. The aim of most, if not all, criminal justice agencies is to reduce offenders' recidivism risk. This article outlines the development and pilot of an Australian-based risk assessment instrument (Australian Risk/Need Inventory; ARNI). The preliminary findings of the ARNI are presented in relation to its reliability, factor structure, as well as empirical considerations for further research. The results indicate that the total score is predictive of reoffending within a six-month period. However, it is argued that other assessments may be needed to ensure a comprehensive risk assessment to make sure that offenders' criminogenic risk/needs are adequately ascertained, rather than relying on a single assessment instrument.

KEYWORDS: recidivism, reoffending, risk assessment, Australian offenders, criminal justice

Estimating an offender's risk of recidivism is important, especially in the context of criminal justice. Doing so, allows for the efficient planning of resources in order to target specific areas of the offenders' life that would otherwise increase their recidivism risk (Van Der Put, 2014). Both assessing and attempting to provide interventions to reduce recidivism risk has benefits for society, as well as for the individual. At an individual level, the offenders' supervisor is able to use the information obtained from the individual and assessments to tailor an individual management plan that identifies areas of risk and need. From this, the offender can be referred to the appropriate services that can enrich the offenders' life (for example, addressing substance abuse issues through drug and alcohol counselling), with the ultimate goal to reduce the likelihood of re-engaging in crime. On the other hand, reducing recidivism risk has many potential benefits including protecting the public from future harm, reducing costs associated with criminal justice, as well as providing preventative measures rather than focusing on the aftermath of crime (Glazebrook, 2010).

Risk assessments are important in identifying and managing offenders, particularly those deemed as having a high recidivism risk. Risk assessments are used for the purpose of measuring the probability that an individual will engage in dangerous or maladjusted behaviours. Reassessment methods are used for periodic adjustments in how an institution meets an offender's criminogenic needs (Kemshall, 2008; Champion, 1994). Many contemporary risk assessments and correctional practices are based upon the RNR model. This model has its conceptual basis in the personality and social learning theories of human behaviour. There are three core underlying principles of the RNR model. These include risk: predicting recidivism and matching treatment services to the level of risk of the offender; need: prioritising identified criminogenic needs for treatment; and responsivity: considering factors that may impinge on an individual's response to treatment programs, including cognitive ability, learning style, therapeutic relationships, and program content (Andrews &

Bonta, 2010). The RNR model has received empirical support in regard to its efficacy in reducing recidivism risk in the correctional justice area. Firstly, when all three principles are adhered to in corrections, the mean effect size using Pearson's *r* was .26 in 60 tests of treatment. This indicates a small to medium effect size. When only two of the three principles are adhered to, the Pearson's *r* drops to .18 in 84 tests, indicating a small effect size. Further, it appears that non-adherence with the RNR principles may actually increase crime and recidivism (Andrews & Bonta, 2010).

The central eight are identified risk and need factors that have been determined to be crucial in the prediction of criminal conduct and future engagement in crime (Andrews & Bonta, 2010). The central eight can be divided into the big four factors and the modest four factors. The big four factors are proposed to be major influential variables in predicting and analysing the criminal behaviour of individuals. These include a history of antisocial behaviour, antisocial personality pattern, antisocial cognitions, and antisocial associates. The modest four factors are considered to be other well-established risk/need factors that while they are important, are less influential in comparison to the big four factors. The modest four factors include family/marital circumstances, school/work, leisure/recreation, and substance abuse. The central eight risk and need factors have received strong support for their predictive utility in assessing an offender's risk of reoffending (Andrews et al., 2011; Girard & Wormith, 2004; Wormith et al., 2007). Andrews and Bonta's research (2010) has confirmed that the grand mean validity estimate for the major factors (that is; the big four factors) exceed that of the moderate four factors (modest four).

Risk assessments have attracted a lot of research interest, and have been improved and enhanced since their emergence in the criminal justice domain in order to increase their predictive utility and reliability. The most recent wave of risk assessments attempt to capture the full picture of all the factors that influence an individual's engagement in crime by incorporating both static and dynamic criminogenic risk/need variables. Static factors are generally historical factors that cannot be changed and are rarely the target of an offender management plan. They can include, for example, criminal history, age at first offence, and abuse and neglect experienced in childhood. Alternatively, dynamic factors are those factors that can be changed and have been linked to recidivism risk. Examples of dynamic factors include employment, education, and prosocial attitudes (Gonsalves et al., 2009). The integration of dynamic factors reinforces the view that an individual’s risk of reoffending is able to be changed and that dynamic variables can be utilised as treatment goals (Andrews & Bonta, 2010).

Gendreau et al. (1996) conducted a meta-analysis of 131 studies to examine correlations with recidivism. Their results indicate that both static and dynamic variables are predictive of recidivism, with the dynamic predictor domains’ performance being comparable to the static predictor domains. Overall, the strongest predictors of future recidivism included criminogenic needs, criminal history/history of antisocial behaviour, social achievement, age/gender/race, and family factors. Weaker predictors of future criminal engagement included intellectual functioning, personal distress factors, and socioeconomic status in the family of origin. Gendreau et al.'s research provides support for the inclusion of dynamic risk/need factors in regard to identifying and targeting these factors with interventions aimed to reduce criminogenic needs and recidivism risk, as well as the central eight factors. The strongest predictors as determined by Gendreau et al. comprise largely of the central eight factors outlined by Andrews and Bonta (2010). The weaker predictors reflect the minor factors that are associated with engaging in criminal behaviour, albeit to a lesser extent in comparison to the central eight factors.

Since the development of the original Level of Supervision Inventory (Andrews, 1982), the Level of Service inventories are one of the most researched and widely used risk assessments that are commercially available. The most recent version, the LS/CMI (Andrews et al., 2004) is the commercially available version of the LSI-OR (Girard & Wormith, 2004). It was developed as a case management tool for correctional workers, as well as trying to adopt a systematic measure to ensure continuity of care across correctional agencies. Lastly, Girard and Wormith wanted to ensure cross-validation and updating of relevant items. This process is recommended with any measure that aims to predict criminal behaviour due to the evolving nature of laws, legal terms, social impacts, and offender populations.

The LSI-OR has been validated on 630 adult male offenders, consisting of 454 inmates and 176 probationers under community supervision. The results of Girard and Wormith's research (2004) indicated that the internal consistency of the 43 General Risk/Need items was excellent ($\alpha = .91$). The internal consistency was acceptable for the Specific Risk/Need Section ($\alpha = .62$). Alpha coefficients for the subscales in the General/Risk Need section varied from poor ($\alpha = .32$; Family/Marital) to good ($\alpha = .80$; Criminal History). In regard to general recidivism, the LSI-OR's predictive capacity for both inmates ($R^2 = .37$) and the community group ($R^2 = .40$) was significant. The LSI-OR's predictive capacity was also significant for violent recidivism for both inmates ($R^2 = .42$) and the community group ($R^2 = .25$). ROC analyses determined that the General Risk/Need section was better able to predict general recidivism (AUC = .73), whilst the Specific Risk/Need section was better able to predict violent recidivism (AUC = .71).

A recent study in Australia examined the predictive utility of the LS/CMI in a population of Tasmanian offenders completing community-based orders (Gordon, Kelty, & Julian, 2014). The results of that study indicated that there were significant sex differences, with males scoring higher on the LS/CMI total score, as well as scoring higher on the Criminal History and Alcohol/Drug Problem subscales in comparison to female offenders. Further, ROC analyses were determined to be significant for males, indicating that the

LS/CMI was able to predict general reoffending within this sample. However, the ROC analysis was not significant for female offenders, but this could be due in part to the small sample of female offenders utilised within that study.

A follow up study (Gordon et al., 2015) investigated the internal reliability and the factor structure of the LS/CMI. The results of this research indicated that the LS/CMI total had excellent internal reliability ($\alpha = 0.9$), however there was variability in terms of internal consistency for the subscales with alpha coefficients ranging from $\alpha = .42$ to $\alpha = .83$. Five of the eight subscales achieved an acceptable or higher level of internal consistency, whilst three of the subscales were identified as poor or unacceptable. These alpha coefficients were comparable to other studies conducted internationally (for example, Hollin et al., 2003; Palmer & Hollin, 2007). With respect to reliability, Nunnally (1978) asserts that instruments used in basic research should have a reliability of .70 or better, whereas for instruments used in applied settings a reliability of .80 may not be sufficient. Rather, where important decisions regarding the fate of an individual is made on the basis of test scores, reliability should be at least .90, preferably .95, or above. As can be seen, most of the alpha coefficients obtained fell below this recommended range. Further, item-total correlations identified that 12 of the 43 LS/CMI items did not have a high correlation with the overall scale, indicating that they did not contribute to the overall scale. The results of the factor analyses were consistent with previous studies (e.g., Loza & Simourd, 1994; Hollin et al., 2003). At a subscale level the LS/CMI produced a two-factor solution with the first factor accounting for 42% of the variance. The Criminal History, Family/Marital, Alcohol/Drug Problem, Procriminal Attitude/Orientation, and Antisocial Pattern subscales loaded onto the first factor, whereas the Education/Employment and Leisure/Recreation subscales loaded onto the second factor. The Companions subscale loaded somewhat evenly across the two factors. However, it is evident that there is a distinction between subscales related to criminal behaviour (including attitudes) and family, and subscales related to lifestyle and engagement. At an item level, a more diverse 12 factor solution was produced, with items from the Alcohol/Drug Problem and Antisocial Pattern subscales loading heavily on the first factor.

Research on the LS/CMI's predecessor, the LSI-R (Andrews & Bonta, 1995), has also indicated that there are issues with using an internationally validated risk assessment within an Australian jurisdiction. Specifically, Hsu's research (2010; Hsu et al., 2009; Hsu et al., 2010; Hsu et al., 2011) acknowledges that whilst the LSI-R is the most empirically validated instrument for the assessment of risk and needs, there needs to be further examination in regard to its use and predictive utility within an Australian context. Hsu's research indicated that whilst male and female offenders do not differ on the LSI-R total score, LSI-R subscale differences were apparent, suggesting differing criminogenic need characteristics for males and females. This difference became more apparent when comparing the scores of Indigenous and non-Indigenous offenders. By examining the factor structure of the LSI-R and developing a recalibrated version, Hsu et al. (2011), determined that the recalibrated LSI-R had a higher predictive utility of reoffending. Their results suggest that the constructs underlying generic risk assessments are not generally transferable across jurisdictions and therefore should be evaluated. Another study examining the LSI-R in an Australian context identified that Australian offenders scored higher across the LSI-R subscales than their Canadian counterparts. These differences were more apparent for Australian female offenders. Due to this, Mihailides et al. (2005) questioned the appropriateness of using Canadian norms to identify Australian offenders' level of risk of recidivism.

The above research indicates that whilst the Level of Service inventories function well internationally, there is some concern for their use within Australia particularly in regard to the assumption that norms are transferable across jurisdictions. Girard and Wormith (2004) state that it is important to ensure cross-validation, including updating items to reflect changing laws and evolving offender populations. From this, it can be argued that it is appropriate to conduct vigorous research on instruments that have been developed outside Australia, before unquestioningly adopting them to guide criminal justice decisions regarding the perceived recidivism risk of an Australian offender.

Aims and Hypotheses

The current study builds on the previous work of Gordon et al. (2014; 2015), by utilising the obtained information from evaluating the LS/CMI and developing a risk assessment instrument to be trialled within a Tasmanian offender population, for offenders completing a community-based order and/or incarcerated. There are two aims of the current study. The first aim is to develop a revised risk assessment for use in a designated Australian population. This revised instrument, the Australian Risk/Need Inventory (ARNI) will be analysed by examining its internal reliability at both a total score and subscale level. The factor structure of the ARNI will also be explored at both a subscale and item level. The second aim of the study is to investigate the relationship between offenders' ARNI total and subscales scores and subsequent reoffending. This attempts to provide information as to whether the ARNI can accurately predict risk of recidivism within the target population. It is hypothesised that the general criminogenic risk factors (the central eight) will be predictive of future reoffending.

Study 1

Method

Participants and Procedure

Participants were obtained from one Australian jurisdiction (Tasmania) during a twelve month period (2013-2014). Participants were selected by staff at the Department of Justice and the ARNI was completed alongside their current protocols and procedures, either at the pre-sentencing stage, or soon after the offender had started his/her order.

The total sample comprised of 301 participants (237 males; 64 females). Of this sample, 29% (79 males, 7 females) were completing custodial sentences and 71% (158 males, 57 females) had been referred to Community Corrections. Thirty-nine participants (13%) identified as Aboriginal or Torres Strait Islander (ATSI; 33 males, 6 females)[3].

The age of the sample ranged from 18 years to 84 years, with a mean age of 32.97 years (*SD* = 11.66). In regard to previous criminal history, 87.4% of the sample had prior offences (90.7% of males, 75% of females), and 46.5% had previously served a custodial sentence (52.7% of males, 23.4% of females).

The current index conviction categories, by sex, can be viewed in Table 18. Where an individual received multiple sentences/convictions, their index conviction for an offence was chosen based on the most serious offence as classified by the National Offence Index (ABS, 2009). No female offenders were convicted of a sexual offence. The sexual conviction category included offences such as sexual relationship with a young person and aggravated sexual assault. The violent offences category included offences such as assault (including common assault), aggravated armed robbery, and murder. The property offences category included crimes related to stealing, fraud, obtaining goods by false pretences, as well as property damage, burglary, and possession of stolen property. Drug offences included those of possessing, manufacturing, or selling/trafficking in controlled or illicit substances. Traffic offences included those such as speeding, drinking while driving, driving without a licence/disqualified and driving negligently. The "other" offences category could be considered quite broad, but consisted mainly of a breach of an order, including bail, parole, community service order, or probations, as well as failure to appear, and evade police.

[3] Offenders who identified as Indigenous were retained in the sample due to their low representation and limitations surrounding data collection. However, it is cautioned that the ARNI should be validated on a larger sample, including examining female and Indigenous differences.

Table 18

Index Conviction Categories by Sex

Offence Category	Males		Females	
	N	%	*N*	%
Sexual	14	5.9	-	-
Violent	91	38.4	19	29.7
Property (including theft)	36	15.2	16	25.0
Drug Offences	18	7.6	4	6.3
Traffic Offences	58	24.5	17	26.6
Other	20	8.5	8	12.5
Total	237		64	

Data was collected over a ten-month period from both the prison and Community Corrections. The data obtained consisted of both file and interview data. Interviews were completed as part of the organisational requirements of the Department of Justice. The revised risk assessment was scored from both the interview and file data.

Measure

Items for the initial trial assessment were sourced from an extensive literature review of criminogenic risk/needs and risk assessment. The findings of Gordon et al. (2014; 2015) also informed the selection of items, where items identified as potentially problematic from analyses on the LS/CMI were adapted and included in the trial risk assessment. The 78-item assessment received feedback from team leaders and probationers working within the Department of Justice. Each item was scored as being present ("yes") or absent ("no"). All items that were marked yes were summed to produce a total score. The preliminary items were originally grouped under subscales that reflected the central eight risk/need factors and can be viewed in Appendix D. This trial risk assessment was then subjected to analyses to refine the instrument (creating the ARNI) and investigating its predictive utility. Staff had previous experience in administering and scoring risk assessments and followed the protocol provided by the researchers in the scoring guidelines that accompanied the risk assessment.

Results

Internal Reliability of the Australian Risk/Need Inventory (ARNI)

Prior to revisions, the original scale consisting of 78 items was analysed to determine which items enhanced the internal reliability of the total scale, and if any items could be reduced or combined to improve the internal reliability. The Cronbach's alpha (α = .94) indicated that the overall scale achieved an 'excellent' level of internal reliability.

DeVellis (2012) recommends that items with low corrected item-total correlations (CITCs of less than .30) should be removed as they represent poorly performing items. DeVellis further recommended that individual items that deflate a subscale's overall alpha be removed even if their CITC is above .30. Using these guidelines, the item-total correlation table indicated that 26 of the items obtained a correlation value of less than 0.3. Of these items, 11 items had corrected item-total correlations ranging from .23 to .29, and 12 items were less than .20. This indicates that these items did not correlate well with the overall scale and may be dropped from the scale, and can be viewed in Table 19.

A total of twenty-three items were removed from the scale, or adapted/combined with other items that improved their CITC. Firstly, this included items that doubled-up on the identified factors (indicating discrete subscales), as well as items that obtained low item-total correlations that indicated that they could be removed from the scale with little impact. For example, the items asking if the individual had three or more offences in the current offending episode was identified as having a low item-total correlation and was removed. It could be argued that the identified items were superseded by other items which may have targeted more serious offences (e.g., asking about previous incarceration). Ten items were combined with other items. This was in part due to low item-total correlations, but when the items were combined this was improved. For example, the items that asked if a mother or father had a criminal record were combined to one question asking if a parent had a criminal record.

Three items (for example, a history of escape from custody) were identified as having very low item-total correlations, and this could be due in part to the small sample size. These items are known to be important to the prediction of recidivism risk as they can be encapsulated in the big four factors (Andrews & Bonta, 2010). Therefore, whilst they were not retained in the 45-item instrument, they have been included as additional considerations to increase an offender's level of risk as part of an administrative/policy override procedure, where necessary. In regard to history of escape from custody, 7.3% of the offenders sampled were scored as affirmative to this item. However, this item may not have been adequately sampled due to the high rate of previous offences and custodial sentences in the sample, which could impact on the capacity for this item to differentiate between low- and high-risk offenders.

Two items were retained in the final version, despite their low item-total correlations. These items included item 7 (being arrested under the age of 18) and item 39 (problematic relationship with other significant familial members and/or partner if applicable). These items were kept as they are items that are reflected in the central eight factors. Again, their low item-total correlation values may be attributed to the sample size.

Table 19

Items Identified as Having Low Item-Total Correlations and Their Values

Item	Item Content	*N*	Mean	*SD*	CICT	αID
A4	Any convictions prior to the current episode?	301	.89	.309	.168	.937
A6	Two or more offending periods prior to the current episode?	301	.84	.364	.239	.937
A11	Three or more offences recorded in the current episode?	301	.67	.472	.298	.936
A12	Any convictions for violent offences? (further assessment required)	301	.45	.499	.245	.937
A13	Any convictions for sexual offences? (further assessment required)	301	.06	.231	-.165	.938
B3	Poor participation or engagement at school	301	.09	.281	.111	.937
B4	Poor interactions with peers at school	301	.06	.244	-.010	.937
B5	Poor interaction with those in authority at school (e.g., teachers, principal)	301	.07	.255	.065	.937
B9	Terminated by employer or significant work-related problems leading up to the offending (12 month period)	301	.11	.309	.135	.937
B10	Poor/unsatisfactory interaction with boss or other workers during the period leading up to the offending (12 month period)	301	.17	.373	.241	.937
C3	Alcohol problem currently or in the 12 month period leading up to the offending?	301	.50	.501	.148	.937
C4	Alcohol use associated with criminal activity?	301	.57	.496	.049	.938
C5	Alcohol use caused problems at home during the six month period leading up to the offending?	301	.35	.476	.205	.937
C7	Alcohol use caused medical or other problems (e.g., clinical) in the 12 months leading up to the offending?	301	.17	.376	.289	.936
D1	Lack of structured activities during the 12 months leading up to the offending?	301	.76	.429	.273	.936
E2	Mother (or equivalent) has an existing criminal record	301	.11	.317	.214	.937
E4	Mother (or equivalent) involved in criminal activities in the 6 months leading up to the individual's own offending behavior	301	.04	.196	.111	.937
E5	Father (or equivalent) involved in criminal activities in the 6 months leading up to the individual's own offending behaviour	301	.05	.218	.161	.937

Table 19 continued.

Item	Item Content	*N*	Mean	*SD*	CICT	αID
E6	Problematic relationship with partner (or equivalent)	301	.51	.501	.136	.937
E7	Partner (or equivalent) has an existing criminal record	301	.17	.376	.128	.937
E8	Partner involved in criminal activities during the period surrounding the offending	301	.18	.384	.204	.937
E9	Problematic relationship with other significant familial relationship (e.g., brother, sister, aunt, etc.) *(If applicable)*	301	.32	.468	.259	.937
F3	Thought sentence was unfair at time of sentencing	301	.33	.472	.254	.937
F5	Intimidated or controlled others during the period surrounding the offending	301	.26	.437	.292	.936
G1	Specialised assessment for antisocial pattern has been completed and diagnosed	301	.08	.271	.229	.937

Notes: CICT: Corrected item-total correlation; αID: refers to the effect on the subscale Cronbach's alpha if item deleted

After the removal of the above 23 items and combining of items (two separate items being transformed into one item), a 45-item scale was obtained. These items were analysed using a factor analysis (see below), and it was suggested that the ARNI consisted of ten subscales. These subscales were named to reflect the items contained in each of the subscales. The ARNI can be viewed in Appendix E and includes full item content. The ARNI total and subscale scores were then reanalysed. As can be seen in Table 20, the internal reliability of the ARNI total score achieved an alpha coefficient of .93 indicating excellent reliability. The ARNI subscale alpha coefficients ranged from α = .66 to α = .93.

Table 20

Internal Consistency of the Australian Risk/Need Inventory

Factor	Subscale	No. of Items	Alpha Coefficient	Descriptive
1	Antisocial Associates	6	.891	Very Good
2	Adult Criminal History	6	.880	Very Good
3	Substance Use	6	.785	Good
4	Frequency of Employment	3	.921	Excellent
5	Juvenile Criminal History	3	.871	Very Good
6	Instrumental Aggression	3	.674	Acceptable
7	Current Employment	4	.887	Very Good
8	Leisure, Recreation & Schooling History	4	.707	Good
9	Antisocial Cognitions	4	.622	Acceptable
10	Familial Relationships & Educational Support	6	.660	Acceptable
	ARNI Total	45	.933	Excellent

The item-total correlations for 45 items composing the ARNI scale can be viewed in Table 21. Two items (items 7 and 38) retained an item-total correlation < 0.3. However it is recommended that the ARNI is validated in a larger sample to confirm if these items remain problematic.

Table 21

Reliability per Item for the Australian Risk/Need Inventory

Item	Subscale	*N*	Mean	*SD*	CICT	αID
1	Adult Criminal History	301	.54	.499	.561	.909
2	Adult Criminal History	301	.58	.495	.548	.909
3	Adult Criminal History	301	.54	.499	.676	.907
4	Adult Criminal History	301	.62	.485	.586	.908
5	Adult Criminal History	301	.52	.500	.679	.907
6	Adult Criminal History	301	.56	.497	.714	.930
7	Juvenile Criminal History	301	.89	.309	.165	.913
8	Juvenile Criminal History	301	.47	.500	.425	.911
9	Juvenile Criminal History	301	.66	.473	.434	.911
10	Instrumental Aggression	301	.45	.498	.504	.910
11	Instrumental Aggression	301	.46	.499	.512	.909
12	Instrumental Aggression	301	.53	.500	.609	.931
13	Antisocial Cognitions	301	.54	.499	.595	.908
14	Antisocial Cognitions	301	.53	.500	.531	.909
15	Antisocial Cognitions	301	.39	.488	.478	.910
16	Antisocial Cognitions	301	.44	.497	.487	.910
17	Antisocial Associates	301	.86	.344	.409	.911
18	Antisocial Associates	301	.80	.400	.402	.911
19	Antisocial Associates	301	.85	.357	.314	.912
20	Antisocial Associates	301	.56	.497	.393	.911
21	Antisocial Associates	301	.34	.475	.426	.911
22	Antisocial Associates	301	.33	.471	.386	.911
23	Current Employment	301	.65	.478	.572	.909
24	Current Employment	301	.62	.485	.613	.908
25	Current Employment	301	.63	.482	.651	.930
26	Current Employment	301	.62	.487	.461	.910
27	Frequency of Employment	301	.49	.501	.501	.910
28	Frequency of Employment	301	.59	.493	.561	.931
29	Frequency of Employment	301	.60	.490	.364	.912
30	Leisure, Recreation and Schooling History	301	.65	.476	.509	.910
31	Leisure, Recreation and Schooling History	301	.67	.469	.592	.908
32	Leisure, Recreation and Schooling History	301	.58	.494	.458	.910
33	Leisure, Recreation and Schooling History	301	.53	.500	.301	.912
34	Substance Use	301	.62	.487	.541	.931
35	Substance Use	301	.69	.463	.401	.932
36	Substance Use	301	.58	.495	.331	.912
37	Substance Use	301	.32	.466	.353	.912
38	Substance Use	301	.65	.477	.181	.914

Table 21 continued.

Item	Subscale	N	Mean	*SD*	CICT	αID
39	Substance Use	301	.50	.501	.376	.911
40	Familial Relationships and Educational Support	301	.60	.491	.456	.932
41	Familial Relationships and Educational Support	301	.34	.475	.384	.933
42	Familial Relationships and Educational Support	301	.42	.494	.373	.911
43	Familial Relationships and Educational Support	301	.61	.488	.361	.912
44	Familial Relationships and Educational Support	301	.22	.417	.342	.912
45	Familial Relationships and Educational Support	301	.51	.501	.331	.933

Factor Analysis

Factor analyses at both the subscale and item levels were undertaken using a principal axis factor analysis with direct oblimin rotation. This method was chosen to explore the underlying latent constructs of the ARNI. An orthogonal rotation method (direct oblimin) was used as the derived factors are likely to be intercorrelated. For a factor to be considered for inclusion, an eigenvalue of >1 was used as the minimum threshold value. Tzeng (1992) argued that when using a principal factor analysis, the eigenvalue of less than 1 rule for component extraction is overly sensitive and overestimates the number of true components to be extracted. Tzeng recommended that the optimal method is to locate the elbow of the curve in the scree plot. Following Cattell's (1966) guidelines, the elbow occurred at the tenth component.

Consistent with the general rule of thumb, only variables with loadings of .30 and above were interpreted as they account for 10% of overlapping variance (Tabachnick & Fidell, 2007). The degree of item cross-loadings across factors (if present) was also considered.

Item level. The data were screened for univariate outliers and no problematic values were identified. Initially, the factorability of the 45 ARNI items was examined. The Kaiser-Meyer Olkin measure of sampling adequacy was .89, above the recommended value of .6, and Barlett's test of sphericity was significant (χ^2 (990, N = 301) = 7439, p < .001). This suggested that the data set was suitable for exploratory factor analysis.

A ten factor solution that explained 64.5% of the variance was selected and confirmed through a visual inspection of the scree plot which indicated a levelling off of eigenvalues after 10 factors (see Figure 5).

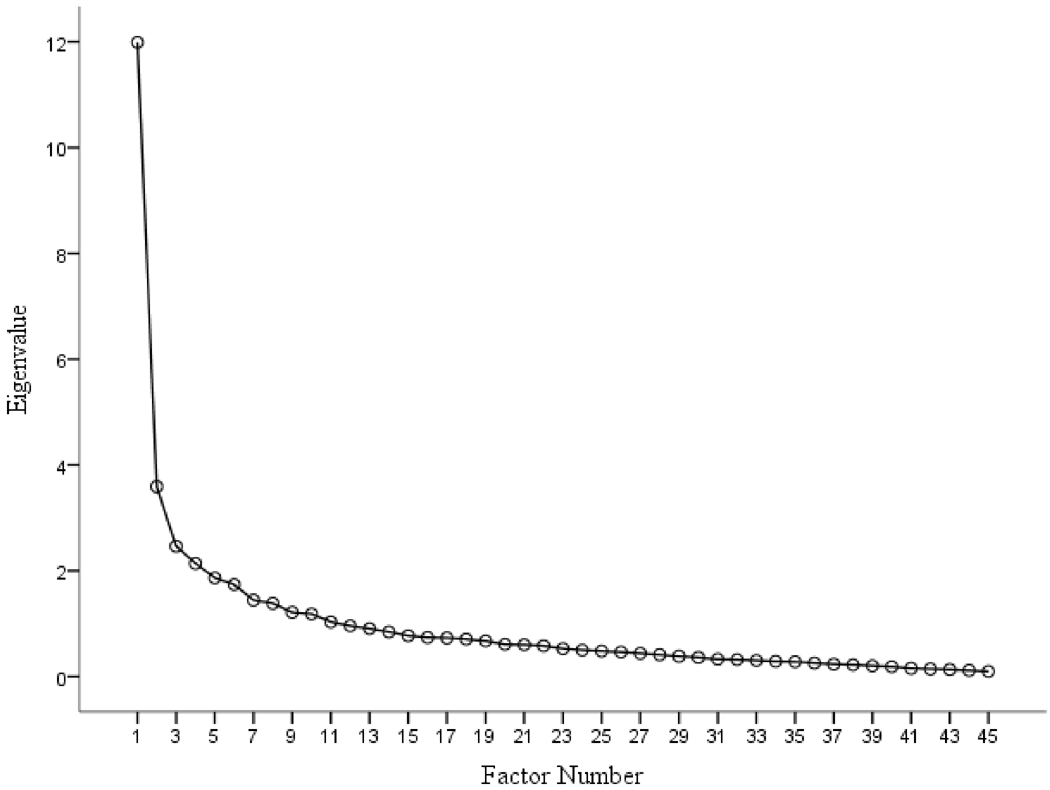

Figure 5. Scree plot indicating a ten factor solution at an item-level for the ARNI.

Initial eigenvalues indicated that the first factor explained 26.6% of the variance and had an eigenvalue of 11.99. Factor two explained almost 8% of the variance and had an eigenvalue of 3.59. Factors three and four had eigenvalues of two and explained 5.48% and 4.75% of the variance respectively. Factors five to ten had eigenvalues of one and explained 2% to 4% of the variance. The eigenvalues and variance explained for each factor can be viewed in Table 22.

Table 22

Eigenvalues and Percentage of Variance Explained for the Ten Factors

Factor	Subscale Name	Eigenvalue	% of Variance
1	Antisocial Associates	11.99	26.65
2	Adult Criminal History	3.59	7.98
3	Substance Use	2.46	5.48
4	Frequency of Employment	2.14	4.75
5	Juvenile Criminal History	1.87	4.15
6	Instrumental Aggression	1.74	3.87
7	Current Employment	1.44	3.21
8	Leisure, Recreation & Schooling History	1.38	3.07
9	Antisocial Cognitions	1.21	2.70
10	Familial Relationships & Educational Support	1.18	2.63

As the full ARNI remains the property of the Department of Justice and Community Corrections (Tasmania) and the University of Tasmania, the items loading on each of the factors are represented by their item numbers. The loadings of each item on their respective factor/subscales are presented in Table 23 (item content of the scale can be viewed in Appendix E). In the majority of instances, each of the factors appeared to be unidimensional. One item loaded across two factors (Factor 4: .406, Factor 7: .483). However, the decision was made to retain the item on Factor 7 as this item loaded more highly and the item fitted more closely with the other items grouped on this factor. As only items with loadings of .30 were considered, three items did not load onto any of the factors (items 33, 39, and 40). These items were placed on subscales that had other items that measured similar identified domains. However it is recommended that the ARNI is validated in a larger sample to confirm if these items belong on the designated factors.

Subscale level. The factorability of the ARNI subscale scores was examined. The Kaiser-Meyer Olkin measure of sampling adequacy was .81, above the recommended value of .6, and Barlett's test of sphericity was significant (χ^2 (45, N = 301) = 576, p < .001). This suggested that the data set was suitable for exploratory factor analysis. A three-factor solution that explained 54.8% of the variance was selected and confirmed through a visual inspection of the scree plot which indicated a levelling off of eigenvalues after three factors (see Figure 6).

Table 23

Factor Structure of the Australian Risk/Need Inventory

Factor	Item Number	Loading
Factor 1: Antisocial Associates	Item 17	.691
	Item 18	.453
	Item 19	.772
	Item 20	.855
	Item 21	.562
	Item 22	.770
Factor 2: Adult Criminal History	Item 1	.465
	Item 2	.631
	Item 3	.749
	Item 4	.799
	Item 5	.732
	Item 6	.751
Factor 3: Substance Use	Item 34	.743
	Item 35	.881
	Item 36	.673
	Item 37	.543
	Item 38	.311
	Item 39	< .30
Factor 4: Frequency of Employment	Item 27	.859
	Item 28	.813
	Item 29	.804
Factor 5: Juvenile Criminal History	Item 7	- .898
	Item 8	- .731
	Item 9	- .669
Factor 6: Instrumental Aggression	Item 10	.862
	Item 11	.412
	Item 12	.524
Factor 7: Current Employment	Item 23	.483
	Item 24	.571
	Item 25	.968
	Item 26	.890
Factor 8: Leisure, Recreation & Schooling History	Item 30	- .321
	Item 31	- .753
	Item 32	- .522
	Item 33	< .30
Factor 9: Antisocial Cognitions	Item 13	.428
	Item 14	.464
	Item 15	.390
	Item 16	.448
Factor 10: Familial Relationships & Educational Support	Item 40	< .30
	Item 41	.353
	Item 42	.556
	Item 43	.436
	Item 44	.360
	Item 45	.360

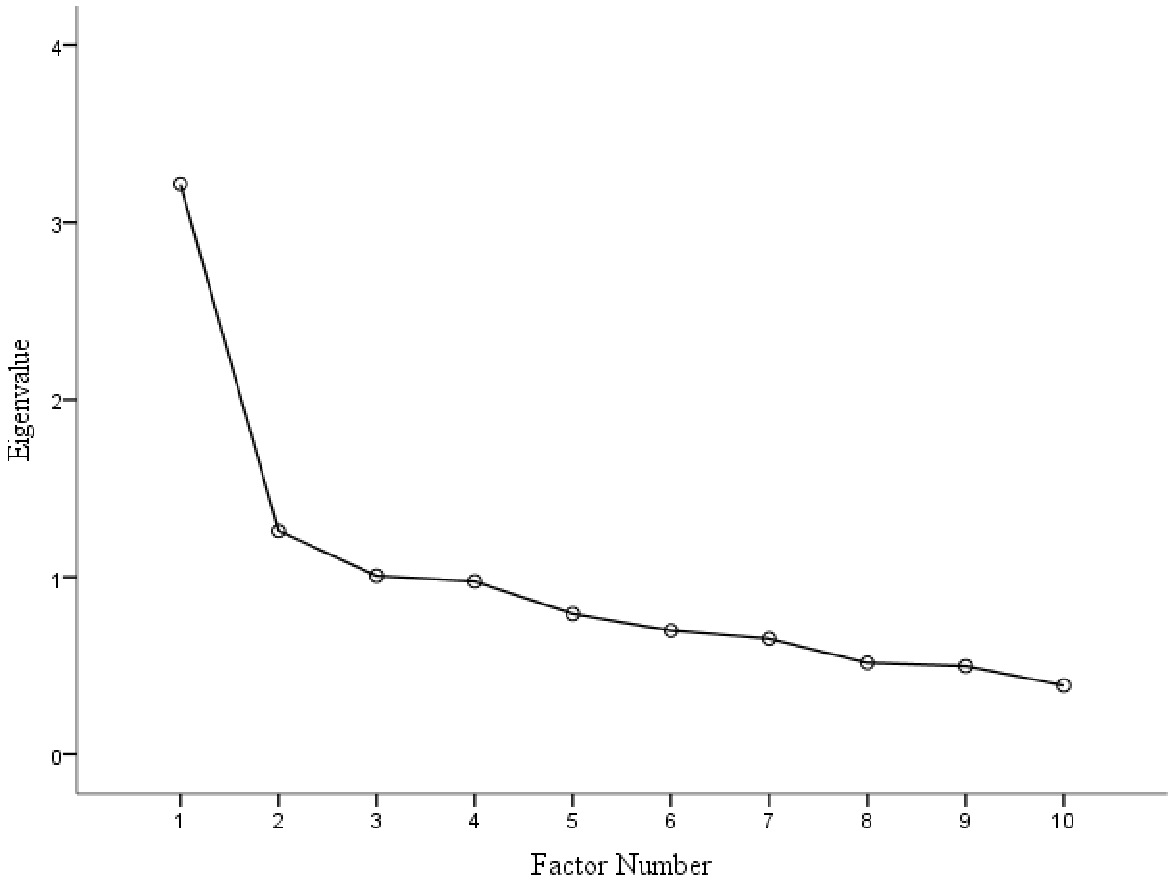

Figure 6. Scree plot indicating a three factor solution at a subscale level for the ARNI.

The factor analysis produced a three-factor solution where factors one, two, and three accounted for 32.17% (eigenvalue = 3.22), 12.60% (eigenvalue = 1.26), and 10.06% (eigenvalue = 1.01) of the variance respectively. The loadings of each of the subscales across the three factors can be viewed in Table 24. It is noted that the Instrumental Aggression subscale loaded almost evenly across factors one and three (.380 and .318 respectively). Further, the Antisocial Associates subscale did not load across any of the factors, and when pushed it loaded on Factor 2 at a relatively low level (.122).

Factor One comprises of criminal history and instrumental aggression suggesting that this factor reflects Antisocial Behaviour. All of the subscales loaded negatively on Factor

Two suggesting that the subscales that loaded onto this scale are protective factors (note that the Antisocial Cognitions subscale loaded on this factor below the recommended .30 threshold). The subscales that loaded onto Factor Two reflect employment and recreation considerations. Factor Three is comprised of lifestyle factors such as substance use and familial relationships. The Instrumental Aggression subscale also loaded onto this factor.

Table 24

Factor Loadings of the ARNI Subscales across the Three Factor Model

Subscale	Factor 1 Antisocial Behaviour	Factor 2 Employment/ Recreation	Factor 3 Lifestyle Factors
Antisocial Associates			
Adult Criminal History	.800		
Substance Use			.314
Frequency of Employment		- .759	
Juvenile Criminal History	.565		
Instrumental Aggression	.380		.318
Current Employment		- .794	
Leisure, Recreation & Schooling History		- .513	
Antisocial Cognitions		- .279	
Familial Relationships & Educational Support			.629

Participant Means and Standard Deviations on the ARNI Subscales and Total Score

The means and standard deviations on the ANRI total and subscale scores are provided in Table 25. *T* tests were conducted to determine if there were significant differences between the scores obtained by Indigenous and non-Indigenous males, and Indigenous and non-Indigenous females. The significantly higher mean scores are marked with an asterisk. The results indicate that Indigenous male offenders scored significantly higher than non-Indigenous males on the Juvenile Criminal History subscale. No other significant differences were found.

Table 25

ARNI Total and Subscale Scores for Males and Females

Scale		Males		Females	
		Indigenous (*N*=33)	Non-Indigenous (*N*=204)	Indigenous (*N*=6)	Non-Indigenous (*N*=58)
Antisocial Associates	*M*	4.00	3.32	3.17	3.21
	SD	2.30	2.50	2.56	2.34
Adult Criminal History	*M*	4.33	3.56	1.83	2.78
	SD	1.87	2.22	1.72	2.23
Substance Use	*M*	4.03	3.79	3.50	3.45
	SD	1.63	1.74	2.26	1.98
Frequency of Employment	*M*	1.94	1.85	1.83	2.10
	SD	1.32	1.37	1.47	1.25
Juvenile Criminal History	*M*	2.39*	1.78	1.00	1.03
	SD	1.09	1.30	1.26	1.24
Instrumental Aggression	*M*	2.00	1.95	1.33	1.43
	SD	1.12	1.10	1.37	1.14
Current Employment	*M*	2.06	1.81	2.17	2.05
	SD	1.69	1.71	2.04	1.74
Leisure, Recreation & Schooling History	*M*	2.97	2.48	2.50	2.38
	SD	1.26	1.43	1.64	1.37
Antisocial Cognitions	*M*	1.76	1.83	2.17	1.50
	SD	1.23	1.33	1.72	1.19
Familial Relationships & Educational Support	*M*	3.24	2.96	2.83	2.93
	SD	2.08	1.76	1.72	1.64
ARNI Total	*M*	28.73	25.35	22.33	22.86
	SD	10.11	11.07	11.00	9.92

*p <.05

Criminogenic Need Profile

Sex differences for Indigenous offenders. ANOVA indicated that there was not a significant sex difference on the ARNI total score, F (1, 37) = 3.84, p = .06. MANOVA on the ARNI subscale scores indicated that there was not a main effect for sex (F (10, 28) = 1.99, p = .074, partial η^2 = .415).

Sex differences for non-Indigenous offenders. ANOVA indicated that there was not a significant sex difference on the ARNI total score, F (1, 37) = 3.56, p = .06. MANOVA on the ARNI subscale scores indicated a significant main effect of sex (F (10, 251) = 2.86, p < .05, partial η^2 = .102). Between subjects effect tests indicated sex differences on the subscales Adult Criminal History (F (1, 260) = 5.68, p < .05, partial η^2 = .021), Instrumental Aggression (F (1, 260) = 15.34, p < .001, partial η^2 = .056), and Leisure, Recreation, and Schooling History (F (1, 260) = 6.21, p < .05, partial η^2 = .023). This indicates that males scored significantly higher than females across these subscales.

Differences between Indigenous and non-Indigenous male offenders. ANOVA indicated that there was not a significant difference between Indigenous and non-Indigenous scores on the ARNI total score for male offenders, F (1, 235) = 2.99, p = .09. MANOVA on the ARNI subscale scores indicated that there was not a main effect for Indigenous status for male offenders (F (10, 226) = 1.50, p = .141, partial η^2 = .062).

Differences between Indigenous and non-Indigenous female offenders. ANOVA indicated that there was not a significant difference between Indigenous and non-Indigenous scores on the ARNI total score for female offenders, F (1, 62) = .131, p = .72. MANOVA on the ARNI subscale scores indicated that there was not a main effect for Indigenous status for female offenders (F (10, 53) = 443, p = .92, partial η^2 = .077).

Correlations

The inter-scale correlations were all highly significant, with the majority significant at the p <.01 level. It can be argued that criminal behaviour changes over the course of one's life, and therefore criminogenic needs may also change (Soothill, Francis, & Fligelston, 2002; Palmer & Hollin, 2007). This is reflected in the number of significant negative correlations found between age and the ARNI total score, and on the following ARNI subscales (all significant at the p <.01 level): Antisocial Associates, Current Employment, Frequency of Employment, Juvenile Criminal History, Leisure, Recreation and Schooling History, and Instrumental Aggression. This suggests that as offenders' age increases, the level of criminogenic risk and needs decrease.

Pearson correlations were calculated between prior offences and prior custodial sentences with the ARNI total and subscale scores. Prior offences were positively, significantly correlated with the ARNI total score, Adult Criminal History, Substance Use, Juvenile Criminal History, and Instrumental Aggression. Prior custodial sentences were positively correlated with the ARNI total score and all of the ARNI subscales, with the exception of the Currently Employed subscale. The direction, magnitude and significance of the above-mentioned correlations can be viewed in Table 26.

Results Summary and Discussion

The current findings indicate that from the original item pool, 45 items added the most information in the development of the ARNI. The Cronbach's alpha for the total score indicated an excellent level of internal reliability. At a subscale level, the internal reliability ranged from excellent to acceptable. For the three scales that achieved an acceptable level of internal reliability, it could be argued that a more comprehensive assessment for these scales is needed. In regard to the factor structure, at an item level a ten factor solution was produced indicating an appropriate grouping of the ARNI items. At a subscale level, a three factor solution was produced suggesting the broad categories of: antisocial behaviour (past and present), protective employment/recreation considerations, and lifestyle factors (substance use, family, and educational achievement). The next section examines the predictive utility of the ARNI.

Table 26

Correlations between Offenders' Age, Prior Offences, Prior Custodial, and ARNI Total and Subscale Scores

Variable	Age	PO	PC	Total	AA	ACH	CE	SU	FoE	JCH	LRSH	IA	FRES	AC
Age	1	-.006	.025	**-.294**	**-.293**	.011	**-.244**	-.079	**-.265**	**-.266**	**-.390**	**-.183**	-.128	-.046
PO		1	**.288**	**.233**	.066	**.402**	.026	.170*	.065	.180*	.064	**.232**	.124	.060
PC			1	**.475**	**.251**	**.693**	.137	.176*	**.231**	**.389**	**.239**	**.313**	.168*	**.262**
Australian Risk/Need Inventory														
Total				1	**.776**	**.553**	**.633**	**.563**	**.702**	**.534**	**.677**	**.571**	**.627**	**.498**
AA					1	**.283**	**.438**	**.321**	**.508**	**.368**	**.506**	**.335**	**.457**	**.354**
ACH						1	.158*	**.252**	**.227**	**.379**	**.237**	**.310**	.175*	.170*
CE							1	**.220**	**.597**	.179*	**.459**	**.253**	**.348**	**.274**
SU								1	**.319**	**.215**	**.365**	**.346**	**.224**	.158*
FoE									1	**.230**	**.521**	**.332**	**.385**	**.321**
JCH										1	**.267**	**.309**	**.222**	**.201**
LRSH											1	**.253**	**.353**	**.286**
IA												1	**.388**	.177*
FRES													1	**.303**
AC														1

NB: PO = Prior Offences, PC = Prior Custodial, AA = Antisocial Associates, ACH = Adult Criminal History, CE = Current Employment, SU = Substance Use, FoE = Frequency of Employment, JCH = Juvenile Criminal History, LRSH = Leisure, Recreation & Schooling History, IA = Instrumental Aggression, FRES = Familial Relationships & Educational Support, AC = Antisocial Cognitions

* *p* <.05 level, Correlations in bold are significant at the *p* <.01 level

Study 2

Method

Participants and Procedure

For the purposes of this part of the study, participants were selected from the sample previously described in study one of this chapter. The criteria for inclusion in this study was that participants from study one must have at least a six-month period from the date of the original index offence, or six months from release from prison or release on parole. This ensured that there were boundary limits around the length of the sentence and that all offenders' reoffending data was for the same period (Ringland, 2011a, Watkins, 2011).

Of the original 301 participants, the data from 200 participants met the six month eligibility criteria to be included in the reoffending and predictive validity analyses. The sample comprised of 149 males (128 non-Indigenous, 21 Indigenous), with a mean age of 33.10 years (*SD* = 11.71, range: 18 – 84) and 51 females (45 non-Indigenous, 6 Indigenous), with a mean age of 31.80 years (*SD* = 9.46, range: 18 – 53 years). Offenders who identified as Indigenous were retained in the sample due to their low representation and limitations surrounding data collection. However, it is cautioned that the ARNI should be validated on a larger sample, including examining female and Indigenous differences.

Of this sample, 12% (20 males, 4 females) had completed a custodial sentence or was released on parole, and 88% (129 males, 47 females) had been referred to Community Corrections. In regard to previous criminal history, 88.5% of the sample had prior offences (93.3% of males, 74.5% of females), and 39% had previously served a custodial sentence (45.6% of males, 19.6% of females). The current index conviction categories, by sex, can be viewed in Table 27. For descriptions of the offence categories, please refer to study one of this chapter.

Table 27

Index Conviction Categories by Sex

Offence Category	Males		Females	
	N	%	*N*	%
Sexual	4	2.7	0	0
Violent	55	36.9	14	27.5
Property (including theft)	22	14.8	12	23.5
Drug Offences	14	8.7	3	5.9
Traffic Offences	44	29.5	15	29.4
Other	11	7.4	7	13.7
Total	149		51	

Measures

ARNI. The ARNI is composed of ten subscales (the number of items on each scale is indicated in parentheses): Adult Criminal History (6), Juvenile Criminal History (3), Instrumental Aggression (3), Antisocial Cognitions (4), Antisocial Associates (6), Current Employment (4), Frequency of Employment (3), Leisure, Recreation and Schooling History (4), Substance Use (6), and Familial Relationships and Educational Support (6). The scores from these subscales are summed to form a total score that informs the level (and the likelihood) of risk of future re-offending for that particular offender. Subscale scores are summed to obtain a total score for the relevant section.

Staff had previous experience in administering and scoring risk assessments and followed the protocol provided by the researchers in the scoring guidelines that accompanied the risk assessment. The ARNI was completed alongside the Department of Justice's current protocols for a pre-sentence report. Where a pre-sentence report was unable to be completed, the LS/CMI was completed within the first few months of the offenders' order. Data is unavailable regarding interventions that offenders' completed during the six-month follow-up.

Reoffending. Because of variances in the length of probation/ supervision, reoffending for the purposes of this study was defined as a reoffence (a formal conviction of an offence) that occurred within six months of the index offence, for which the offender was convicted in 2013/2014. For those offenders who received a custodial sentence, data were collected from the date they were released into the community. This ensured that there were boundary limits around the length of the sentence and that all offenders' reoffending data were for the same time period (Ringland, 2011a; Watkins, 2011).

Statistical Analysis and Results

Reoffending Rates

A total of 92 (46%) offenders reoffended in the follow-up period. This comprised of 45.6% of the male offenders and 47.1% of the female offenders. A chi-square analysis indicated that there was not a significant sex difference in regard to reoffending rates (χ^2 (1, N = 200) = .031, p = .860).

Participant Means and Standard Deviations on the ARNI Subscales and Total Score

The means and standard deviations on the ANRI total and subscale scores are provided in Table 28. *T* tests were conducted to determine if there were significant differences between the scores obtained by Indigenous and non-Indigenous males, and Indigenous and non-Indigenous females. The significantly higher mean scores are marked with an asterisk. The results indicate that Indigenous male offenders scored significantly higher than non-Indigenous males on the Instrumental Aggression subscale. Non-Indigenous females scored significantly higher on the Juvenile Criminal History subscale compared to

Indigenous females, whilst Indigenous females scored significantly higher than non-Indigenous females on the Familial Relationships and Educational Support subscale. No other significant differences were found.

Table 28

ARNI Total and Subscale Scores for Males and Females

Scale		Males: Indigenous (*N*=21)	Males: Non-Indigenous (*N*=128)	Females: Indigenous (*N*=6)	Females: Non-Indigenous (*N*=45)
Antisocial Associates	*M*	3.67	3.07	3.17	3.11
	SD	2.60	2.47	2.56	2.32
Adult Criminal History	*M*	3.95	3.38	1.83	2.76
	SD	1.88	2.20	1.72	2.20
Substance Use	*M*	1.71	1.70	3.50	1.96
	SD	1.71	1.69	2.26	1.72
Frequency of Employment	*M*	3.48	3.72	1.83	3.47
	SD	1.75	1.73	1.47	1.97
Juvenile Criminal History	*M*	1.76	1.84	1.00	2.09*
	SD	1.38	1.33	1.26	1.24
Instrumental Aggression	*M*	2.38*	1.70	1.33	1.11
	SD	1.07	1.31	1.37	1.27
Current Employment	*M*	2.76	2.49	2.17	2.60
	SD	1.34	1.37	2.04	1.30
Leisure, Recreation & Schooling History	*M*	1.76	1.81	2.50	1.51
	SD	1.22	1.10	1.64	1.14
Antisocial Cognitions	*M*	2.76	2.77	2.17	2.96
	SD	2.14	1.72	1.72	1.64
Familial Relationships & Educational Support	*M*	1.57	1.54	2.83*	1.51
	SD	1.33	1.24	1.72	1.14
ARNI Total	*M*	25.81	24.03	22.33	23.07
	SD	10.50	10.40	11.00	9.02

*p <.05

Criminogenic Need Profile

Sex differences. Due to the low number of participants, the total sample of males and females were compared, irrespective of Indigenous status. This was done as a result of the minimal significant differences between Indigenous and non-Indigenous scores on the ARNI total and subscale scores. ANOVA indicated that there was not a significant sex difference on the ARNI total score, F (1, 198) = .631, p = .428. A MANOVA conducted on the ARNI subscales indicated a main effect for sex (F (10, 189) = 2.01, $p < .05$, $\eta^2 = .096$). Between-subjects tests indicated sex differences on the subscales Adult Criminal History (F (1, 198) = .009, $p < .05$, $\eta^2 = .027$) and Instrumental Aggression (F (1, 198) = 11.01, $p < .05$, $\eta^2 = .053$). This indicates that male offenders scored significantly higher than female offenders across these subscales.

Validity Estimates

Bivariate correlations (Spearman's Rho) were used to examine the relationship of reoffending to the ARNI total and subscale scores by sex. Table 29 presents these correlations. For male offenders, the ARNI total score and the ARNI subscales (with the exception of the Adult Criminal History, Antisocial Cognitions, and the Familial Relationships and Educational Support subscales) were positively correlated with reoffending, indicating that a higher score on these scales is associated with an increase in reoffending. Further, for males there was a significant negative correlation with age, indicating that as age increases there is a decrease in reoffending. No significant correlations were determined for female offenders, but this could be due to the smaller sample size.

Table 29

Bivariate Correlations between Reoffending with the ARNI Total and Subscale Scores

Scale	Male Offenders	Female Offenders
Antisocial Associates	.24**	.01
Adult Criminal History	.15	.02
Substance Use	.22**	.01
Frequency of Employment	.21*	-.16
Juvenile Criminal History	.29**	.02
Instrumental Aggression	.22**	.11
Current Employment	.24**	.05
Leisure, Recreation & Schooling History	.19*	-.06
Antisocial Cognitions	.15	.05
Familial Relationships & Educational Support	.07	.23
ARNI Total Score	.30**	.02
Age	-.21*	-.14

*p <.05, **p <.001

Sequential Logistic Regression

A sequential logistic regression was used in order to investigate the predictive utility of the LS/CMI in regard to reoffending. The control variable of age was entered into the first step to provide a model of the reoffending outcome. This produced a model that showed whether the control variable predicted outcome. Age was used as a control variable as it has been found to be a predictor of reoffending (for example, Lowenkamp et al., 2001; Hollin & Palmer, 2006; Holsinger et al., 2006; Hsu, 2010). Due to the small sample size, the total sample were analysed to improve the statistical reliability of the analyses.

ARNI total score. The control variable of age was entered into the first step to provide a model of the reoffending outcome. The ARNI Total score was then added into the second step of the model. The beta coefficients and effect sizes (Exp β) for the models predicting reoffending in the sample of offenders are displayed in Table 30. The overall successful classification rate for the logistic regression model based on age and LS/CMI Total score was 61%. The model successfully predicted outcomes for the 54.3% of offenders who reoffended, and 66.7% of the offenders who did not reoffend. The probability of recidivism was not significantly predicted by the ARNI Total score after controlling for age, χ^2 = (1, N = 300) = 14.10, p = .079, Cox & Snell R^2 = .08, Nagelkerke R^2 = .11.

Table 30

ARNI Total Score as a Predictor of Reoffending

	B	SE of β	Exp(β)	CI of Exp(β)
Age (2013)	-.03	.015	.966	.94 - .1.00
Total Score	.04	.016	1.04	1.01 - 1.07

* p < .05. ** p < .001.

However, the Exp (β) was significant for both age and the ARNI total score. This indicates that in this sample of offenders, an increase in age is associated with a decrease in the likelihood of reoffending. Also, an increased ARNI total score is also associated with a greater likelihood of reoffending after controlling for the effects of age. However, this is a relatively weak effect size based on the value of Exp (β). This means that for each one unit increase in the ARNI Total score, the chances of recidivism increases by 0.04.

ARNI subscale scores. The control variable of age was entered into the first step to provide a model of the reoffending outcome. The LS/CMI subscale scores were then entered into the second step of the model. The overall successful classification rate for the logistic regression model based on age and the ARNI subscale scores was 65.5% for this sample of offenders. The model successfully predicted outcomes for the 60% of the 37 offenders who did reoffend, and 70% of the offenders who did not reoffend. The probability of recidivism was not significantly predicted by the ARNI subscale scores after controlling for age in this sample of offenders: χ^2 = (8, 300) = 10.41, *p* = .24, Cox & Snell R^2 = .10, Nagelkerke R^2 = .13. The values of Exp (β) and significance levels can be viewed in Table 31.

Table 31

ARNI Subscale Scores as a Predictor of Reoffending

Subscale	B	SE of β	Exp(β)	*p* value	CI of Exp(β)
Age (2013)	-.04	.017	.964	.037	.93 – 1.00
1. Antisocial Associates	-.02	.082	.979	.796	.83 – 1.15
2. Adult Criminal History	.05	.078	1.06	.493	.91 – 1.23
3. Substance Use	.04	.112	1.03	.795	.83 – 1.28
4. Frequency of Employment	.03	.096	1.03	.742	.86 – 1.25
5. Juvenile Criminal History	.25	.158	1.28	.119	.94 – 1.75
6. Instrumental Aggression	.15	.131	1.16	.264	.90 – 1.50
7. Current Employment	-.07	.150	.94	.667	.70 – 1.26
8. Leisure, Recreation & Schooling History	-.04	.159	.96	.809	.71 – 1.31
9. Antisocial Cognitions	.05	.104	1.05	.661	.85 – 1.28
10. Familial Relationships & Educational Support	.05	.134	1.05	.719	.81 – 1.37

Receiver Operator Characteristic (ROC) analysis

Due to the small sample size, the total sample was analysed to improve the statistical reliability of the analyses. The AUC for the ARNI Total score was significant at the $p < .01$ level (AUC = .633, 95% CI [.556, .710]). Table 32 presents the AUC values and significance for each of the ARNI subscales, and indicates that five of the 10 subscales were predictive of reoffending within a six-month period. All significant ROC predictions are marked with an asterisk for ease of reading.

Table 32

ARNI Total and Subscale Scores as Predictors of Reoffending

Subscale		Area Under the Curve	Standard Error	Level of Significance (*p* value)	95% CI of AUC
1	Antisocial Associates	.604	.040	.011*	.525 - .683
2	Adult Criminal History	.563	.041	.124	.483 - .643
3	Substance Use	.560	.041	.146	.480 - .639
4	Frequency of Employment	.616	.040	.005*	.538 - .693
5	Juvenile Criminal History	.601	.040	.014*	.522 - .680
6	Instrumental Aggression	.567	.041	.101	.487 - .647
7	Current Employment	.593	.040	.024*	.514 - .672
8	Leisure, Recreation & Schooling History	.609	.041	.008*	.529 - .688
9	Antisocial Cognitions	.560	.041	.145	.480 - .640
10	Familial Relationships & Educational Support	.572	.040	.078	.493 - .652
	ARNI Total	.633	.039	.001*	.556 - .710

Discussion

This study provides preliminary information in regard to the psychometric properties of the Australian Risk/Need Inventory (ARNI), developed in Tasmania, Australia. Specifically, this study examined the internal reliability of the ARNI scale, criminogenic risk and need in the current sample, the factor structure of the ARNI at both an item and subscale level, and the predictive utility of the ARNI using both the total score and the individual subscale scores as identified through the factor analyses. The implications of each of these findings in terms of the ARNI's psychometric properties are discussed in turn. This section also provides considerations for further assessments to be completed in order to adequately measure the identified criminogenic risk/needs. Lastly, the implications and future research considerations are discussed, including increasing the sample size and extending the follow-up period from six months to twelve or twenty-four month periods.

Australian Risk/Need Inventory

The initial 78 items that composed the original trial instrument were examined. After removing and/or combining items as indicated by the item-total correlation table and preliminary factor analyses, a 45-item scale was produced. In relation to internal consistency, the alpha coefficients determined that the ARNI total score had an excellent level of internal consistency ($\alpha = 0.9$). At a subscale level, the internal reliability ranged from acceptable to excellent. The results of the ROC analysis determined that the ARNI total score was predictive of any reoffending within a six-month period at a fair discriminative ability. The ROC analysis for the ARNI is comparable to that found for the LS/CMI in Gordon et al. (2014; 2015). However, the ARNI demonstrates a higher level of internal consistency at both a subscale and total level compared to the LS/CMI.

The results of the factor analysis indicated that at an item level, a ten-factor model was produced and accounted for 64.5% of the variance. These factors were named: Antisocial Associates; Adult Criminal History; Substance Use; Frequency of Employment; Juvenile Criminal History; Instrumental Aggression; Current Employment; Leisure, Recreation and Schooling History; Antisocial Cognitions; and Family Relationships and Educational Support. At a subscale level, a three-factor model was produced. These factors were: antisocial behaviour; protective employment and recreational engagement considerations; and lifestyle factors. All items loaded negatively on the employment and recreational engagement factor, suggesting that this may be a protective factor

In regard to Factor 2, previous research (for example, Olver et al., 2014) indicates that antisocial behaviours are a strong predictor of recidivism. As a result, it follows that having stable employment, recreational interests and minimal antisocial cognitions would result in a lower recidivism risk, in comparison to those individuals who are unemployed or frequently changing employment, minimal recreational interests, and have procriminal attitudes and cognitions.

Description of Factors

Antisocial associates (6 items). The Cronbach's alpha for this subscale indicated very good internal reliability. The items loading onto this subscale are those that address the level of involvement with criminal friends/associates, whether they have committed crime with others, and if the offender is considered to be living in a procriminal environment. This subscale was determined to significantly predict reoffending within a six-month period.

Adult criminal history (6 items). The Cronbach's alpha for this subscale indicated very good internal reliability. The items loading onto this subscale are those that address previous criminal history as determined by official records, including previous convictions, incarcerations, and compliance issues completing community orders. This subscale did not significantly predict reoffending within a six-month period.

Substance use (6 items). The Cronbach's alpha for this subscale indicated good internal reliability. The items loading onto this subscale are those that address both past and current substance use and the impact that substance use has had in an offender's everyday life. This subscale was not determined to significantly predict reoffending within a six-month period.

Frequency of employment (3 items). The Cronbach's alpha for this subscale indicated excellent internal reliability. The items loading onto this subscale are those that address how frequently the offender has been unemployed or changing employment. This subscale was determined to significantly predict reoffending within a six-month period.

Juvenile criminal history (3 items). The Cronbach's alpha for this subscale indicated very good internal reliability. The items loading onto this subscale are those that address the offenders' juvenile criminal history and severity of adjustment in childhood. This subscale was determined to significantly predict reoffending within a six-month period.

Instrumental aggression (3 items). The Cronbach's alpha for this subscale indicated an acceptable level of internal reliability. The items loading onto this subscale include an official record of assault/violence, as well as intimidation or anger management difficulties. This subscale was not determined to significantly predict reoffending within a six-month period.

Current employment (4 items). The Cronbach's alpha for this subscale indicated very good internal reliability. The items loading onto this subscale are those that address current employment and the level of engagement in their employed role. This subscale was determined to significantly predict reoffending within a six-month period.

Leisure, recreation & schooling history (4 items). The Cronbach's alpha for this subscale indicated good internal reliability. The items loading onto this subscale are those that address how an offender uses his/her spare time. This subscale was determined to significantly predict reoffending within a six-month period. Whether an offender was ever suspended or expelled from school also loaded onto this factor.

Antisocial cognitions (4 items). The Cronbach's alpha for this subscale indicated an acceptable level of internal reliability. The items loading onto this subscale included assessing an offenders' level of support and attitudes towards crime. This subscale was not determined to significantly predict reoffending within a six-month period.

Familial relationships & educational support (6 items). The Cronbach's alpha for this subscale indicated an acceptable level of internal reliability. The items loading onto this subscale include assessing parental and significant familial and partner relationships involvement in crime. This subscale was not determined to significantly predict reoffending within a six-month period. Whether an offender achieved less than grade ten education also loaded onto this factor. Research is available which indicates a strong correlation between parent's education and socio-economic status and their children's educational achievement (Schnabel, Alfeld, Eccles, Koller, & Baumert, 2002). Further parental involvement can be considered essential as it has been demonstrated to significantly affect children's academic success (Berthelsen & Walker, 2008; Blair, 2014). In regard to parent's involvement in the criminal justice system, there are established associations between family risk factors, such as substance abuse, mental health problems, and lack of education, and their children developing serious problems that could increase their risk of being involved in the criminal justice system (Murray & Farrington, 2005; Phillips, Erkanli, Keeler, Costello, & Angold, 2006). It could also be argued that if there is a strong acceptance of crime within the family unit, educational achievement may be considered of a low priority. Further, a culture of antisocial behaviour may be fostered within the home environment, combined with other factors (for example, inadequate supervision and care, substance abuse, domestic violence, parental incarceration, and exposure to other risks), which would have a profound impact on a child and an impact on his/her ability to engage effectively with an educational institution. This subscale may require further consideration in regard to effectively measuring familial relationships and education within this sample.

Recommendations for Further Assessment

Adult criminal history. Whilst the central eight factors indicate that criminal history is a predominant predictor of criminal behaviour (Andrews & Bonta, 2010), this subscale was not determined to significantly predict reoffending within a six-month period. This could arise due to the current sample size or, alternatively, a large proportion of the sample reoffended (46%) which may affect the scales sensitivity to discriminate between recidivists and non-recidivists. It could also be attributed to the age of the current sample. The mean age of the current sample was about 32-33 years of age (with age ranging from 18 to 84 years). This is comparable to previous studies, for example the mean age of Girard and Wormith's (2004) sample was 31.78 (*SD* = 9.69) when validating the LSI-OR. A larger sample would be able to diversify the age range as well as providing age categories in order to compare recidivism against offender age groups. Further, juvenile criminal history was a significant predictor of reoffending within the six month period, which may suggest that with a larger sample, the adult criminal history subscale will be able to reflect life-course persistent offenders (Moffit, 1993; Moffitt & Caspi, 2001) and/or persistent serious offenders (Howitt, 2009). Life-course persistent offenders refers to a group of offenders who frequently commit criminal acts including recidivating soon after being released from prison, and who have accumulated many risk factors across the course of their lifespan, usually beginning in childhood. Juvenile criminal history could also indicate a risk factor to reoffending, which may require further consideration particularly in regard to retaining these at risk individuals within the schooling environment, and ensuring adequate parental care and support.

Substance use. Both alcohol and drug (illicit and prescription) use are important considerations when determining an offender's risk of recidivism. The ABS (2005) determined that in 2004, 37% of detainees in the Drug Use Monitoring in Australia Program attributed at least some of their offending to their illicit drug use and/or to support drug habits. Research has determined that drug use affects recidivism (White & Gorman, 2000). A meta-analysis by Bennett, Holloway and Farrington (2008) determined that the odds of engaging in criminal conduct is almost three times higher for active drug users, however the likelihood of offending may be mediated by the type of drug used. Research conducted by Wooditch, Tang and Taxman (2014) examined a sample of drug-involved probationers. Their research indicates that significant changes in this sample can occur over a 12 month period, with the most significant change occurring in the six to twelve month period. Further, reductions in drug use and alcohol use days, combined with reductions in family criminal networks and increases in licit income, can accelerate reductions in recidivism within this six-month period. Previous research which examined predicting offending within a Tasmanian population indicated that whilst the Substance Use scale of the LS/CMI had adequate internal reliability, it was not able to predict future reoffending within a 12 month period (Gordon et al., 2014). It could be argued that, especially for this population, substance use and reoffending is a complex area that is being assessed too simplistically, and as a result it is not assessing the subtle links between substance use, crime and future reoffending. Therefore, this is an area that will require further research within this population.

Instrumental aggression. Attempting to predict violent or aggressive behaviour and its relationship to an individual's actions including reoffending can be problematic due to the various definitions relating to the behaviour as well as the context in which it is being assessed (for example, general violence, sexual, spousal/domestic). It is generally recommended that assessment tools are used whenever possible as it is established that structured assessments are more reliable and accurate compared to unaided clinical judgement (Australian Psychological Society, 2005). If using a formal assessment, it is important to select a tool that produces the highest rate of predictive validity in the population in which it is intended to be used (Singh et al., 2011), as with any assessment. Fazel et al. (2012) conducted a systematic review and meta-analysis of 73 samples. Their results indicated that risk assessment tools designed to predict violent offending perform better than those aimed at predicting sexual or general crime. Further, their predictive accuracy varies on how the risk assessments are utilised, and appear to identify low risk individuals with high levels of accuracy. Fazel et al. suggest that whilst a violent/antisocial behaviour risk assessment tool is not sufficient in isolation to other risk assessments, they can be used to classify individuals at a group level as well as screening out low risk offenders. Examples of violent/antisocial risk assessment measures include: Violence Risk Appraisal Guide (Quinsey, Harris, Rice & Cormier, 2006), Spousal Assault Risk Assessment (Kropp, Hart, Webster, & Eaves, 1995), and the Structured Assessment of Violence Risk in Youth (Borum, Bartel, & Forth, 2006). As a result, it is recommended that violent/antisocial risk assessments are included alongside a general risk recidivism instrument to provide more information regarding an offender's recidivism risk of violent behaviour. If an offender obtains a high score on the Instrumental Aggression scale, it is recommended to follow this up with further assessment to confirm an offender's recidivism risk as well as appropriate interventions to lower this risk.

Familial relationships and educational support. This may be a difficult area to assess due to the structure of the family unit, as well as the separation of parents (and the subsequent partners), and the introduction of half- and step-siblings. This issue is further compounded when accounting for Indigenous offenders and their family and kinship ties. The impact of the family unit and the offending behaviour may require further investigation, particularly in regard to what factors may protect an individual from not engaging in crime when their family of origin is crime orientated. A recent study by Goodwin and Davis (2011) examined engagement in criminal activities in six Tasmanian families that were known to police and corrective services. From this study, it could be concluded that there appeared to be support for the intergenerational transmission of crime with a relatively large proportion of family members from these families having at least one conviction, and/or served a custodial sentence. In particular, regardless of gender, the more serious the parent's criminal record, the greater the probability of their offspring engaging in criminal activities in comparison to children of parents who do not have a criminal record. The father's criminal record appeared to have a greater influence than that of the mother's record. Therefore, addressing the needs of this population could help enrich the family's life as well as reducing the rate of reoffending and to help break the cycle of crime within families.

As mentioned previously, Andrews and Bonta (2010) suggest that it is the early history of antisocial behaviour that leads to poor academic and vocational achievement. Having less than a standard grade ten education may preclude an individual from many future vocational choices, and as a result affects their motivation and engagement in paid employment. It could be argued that up until grade ten (16 years), a child is generally supported by their family, therefore having a crime orientated family, or a family that does not see the importance in educational attainment, would have an impact on whether or not the child completes their schooling.

Antisocial cognitions. Antisocial cognitions are one of the major four factors of the central eight in relation to predicting future engagement of criminal behaviour (Andrews & Bonta, 2010). Antisocial cognitions have a reinforcing role in relation to criminal behaviour, especially in terms of the justification and rationalisation of engaging in criminal conduct. Such cognitions may include, for example, "I need to steal because I have no money" and "it's okay to steal from large businesses as they have insurance" (Palmer & Hollin, 2004). Research demonstrated that there is a significant relationship between high-risk offenders reporting a higher level of negativity towards the criminal justice system as well as high level of attitudes supportive of law violation and identification with criminal peers (Andrews & Bonta, 2010). These types of antisocial cognitions and criminal thinking errors reinforce criminal lifestyles through self-interest, lack of engagement in prosocial activities, denying responsibility for their behaviour, as well as pleasurable or deviant thoughts about criminal activity (Henning & Freuh, 1996). As a result, it is crucial to adequately assess this domain due to its relationship with future criminal conduct. Therefore, a four-item subscale (as used in the current research) may not be adequate, rather it could be used to screen offenders and identify those that may need to be followed-up with a more in-depth assessment relating to antisocial cognitions. Examples of empirically validated assessments that could be used to supplement the current assessment include: Psychological Inventory of Criminal Thinking Styles (Walters, 1995), Criminal Thinking Scale (Knight, Garner, Simpson, Morey, & Flynn, 2006), Criminal Delinquency Scale (Le Blanc, McDuff, Frechette, Langelier, Levert, & Trudeau-LeBlanc, 1996), and the Criminal Cognition Scale (Tangney, Stuewig, Furukawa, Kopelovich, Meyer, & Cosby, 2012). Doing so would provide a rich source of information regarding antisocial cognitions and would provide specific areas for targeted interventions in order to reduce recidivism risk.

Limitations

One of the limitations of this study included that for the purposes of this preliminary analysis, the data for males and females were combined due to the small sample size. Whilst it is argued that assessments based on the Risk-Need-Responsivity model are gender neutral, other research has argued that females have different criminogenic risk/needs in comparison to male offenders, which may impact upon results (Hannah-Moffat, 2006; 2009). Obtaining a larger sample size would allow further investigation of the predictive utility of the ARNI in regard to gender differences, Indigenous status, risk level of the offenders (for example, low, medium, high), as well as comparing differing population samples (those offenders incarcerated compared to those completing community based orders). Further, the six-month period for this preliminary analysis was chosen due to the time-constraints of the doctoral research. It is recommended that a longer follow-up period is conducted, conducting analyses at a 12-month, 24-month, and a five-year period to determine if the reoffending data and predictive utility of the ARNI remains stable. By extending the time period, data will be available for those who no longer have regular contact with justice agencies (either through release or completion of their community orders), and therefore recidivism rates without this regular contact can be examined.

A variable that was not controlled for, but could affect an offender's recidivism risk, includes participation in and completion of intervention programs offered either within the Department of Justice and/or externally (for example, drug and alcohol counselling). The level and intensity of supervision for offenders is also a consideration as offenders identified as being of high recidivism risk tend to have a more intensive supervision management plan. A higher level of supervision and intervention may result in a reduced rate of reoffending, thus impacting the relationship between the ARNI and reoffending (Watkins, 2011). Therefore, it is suggested that this is accounted for in future studies which could explore whether, and what kind of interventions reduce an individual's likelihood of reoffending.

The current sample could be considered a relatively high-risk heterogeneous sample, with a large proportion of offenders committing violent (assault) and traffic offences and a high rate of reoffending. Further, whilst attempts were made to diversify the sample in terms of collecting data from both the prison and community corrections, a large proportion of the sample was obtained from community corrections. This could indicate a homogenous population with lower diversity in their offences in comparison to a larger sample of offenders, and a limited ability in the ARNI to detect differences between low- and high-risk offenders. Because of this, the results obtained from the current study may not be applicable across all offender sentencing categories and may be biased towards offenders classified as medium to high risk. Further, research comparing offenders who have been incarcerated with those completing community orders is required to determine if there are any significant differences between these two populations.

Conclusions

Assessing an offender's recidivism risk is an integral part of case planning within a corrective services environment. It is particularly important to identify offenders' criminogenic risk/needs, especially in high-risk offenders, in order to develop an effective case management plan that specifically targets areas of concern for the individual offender. The information gained from such risk assessments can be used for policy decisions including whether to release an offender from custody, parole or probation conditions, and his/her potential eligibility for community corrections orders. It is important to use assessments that have established empirical reliability and validity, especially in the population in which it is intended to be used.

The current study outlines the development of the ARNI and provides preliminary analyses. It also builds on and contributes to the work in criminological research pertaining to risk assessment instruments, particularly in a sample of Australian offenders. In relation to scale development, from a pool of 78 items, 45 items were identified as valuably contributing to the scale and were retained for the final version of the ARNI. The Cronbach's alpha for the ARNI total score indicated an excellent level of internal reliability. At a subscale level, the internal reliability ranged from excellent to acceptable. For the three scales that achieved an acceptable level of internal reliability, it could be argued that a more comprehensive assessment of these scales is needed.

In regard to the factor structure, at an item level a ten factor solution was produced indicating an appropriate grouping of the ARNI items. At a subscale level, a three factor solution was produced suggesting the broad categories of: antisocial behaviour (past and present), protective employment/recreation considerations, and lifestyle factors (substance use, family, and educational achievement). In regard to predictive utility, ROC analyses determined that the ARNI total score was determined to be predictive of reoffending. At a subscale level, ROC analyses indicated that five of the ten subscales were predictive of reoffending. However, it is likely that the small sample size, combined with the limited reoffending follow-up period (six months) and high-rate of recidivists within the small sample could have reduced statistical power within the analyses leading to low AUC values obtained and/or affecting the predictive validity of the ARNI subscales. Whilst the AUC value for the ARNI total score is comparable to that obtained for the LS/CMI total score in Gordon et al. (2014; 2015), it is important to note that those studies had a longer follow-up reoffending period of 12 months. Further, the LS inventories have consistently demonstrated a fair performance in terms of discriminating those who reoffend from those who do not (for example, Ringland, 2011a; Watkins, 2011; Guay, 2012). As a result it is important to provide further validation for the ARNI, and only a preliminary analysis is presented here.

There were several identified limitations pertaining to the current administration of the ARNI. These include administering the ARNI in a larger sample size, the current sample comprised of a medium- to high-risk heterogeneous sample, extending the follow-up timeframe past six months, and exploring the criminogenic risk/needs and predictive utility for females and males, as well as for Indigenous offenders. Despite these shortcomings, the current study indicates that the ARNI total score demonstrates a fair predictive ability in discriminating between offenders who reoffend and those who do not within a six-month period. All of the subscales have an adequate, or higher, level of internal reliability. For those scales that did not predict reoffending, it is suggested that extending the sample size, which would also result in a larger variability in offenders, will provide more information on their predictive utility. However, it is also suggested that the current subscales can be utilised as an initial screening measure to determine whether a more comprehensive risk assessment is required. Combining the current risk assessment with specialised assessments will result in a wealth of information that could be used for case management planning in order to lower recidivism risk. Specialised instruments, such as those for measuring antisocial cognitions, will be more sensitive to the subtle and complex criminogenic needs relating to the central eight risk/need factors. This will provide the most comprehensive risk assessment process and will allow criminal justice agencies to utilise their limited resources efficiently and effectively.

5

General Discussion

In the criminal justice arena, risk assessments aim to identify an offender's recidivism risk, or the likelihood that he/she will engage in future criminal activities. This is crucial in identifying those offenders deemed to be at a high risk of reoffending, given that a large proportion of crime is committed by persistent, chronic recidivists (Yang et al., 2010). Risk assessments can be used to inform an offender's sentence, including the length of his/her incarceration, release onto parole, and probation and community service order conditions. Further, such information allows for the efficient planning of criminal justice resources to target specific areas of need in the offenders' life that would otherwise increase his/her recidivism risk (Van Der Put, 2014). Reducing recidivism risk has many potential benefits including protecting the public from future harm, reducing costs associated with criminal justice, as well as providing preventative measures rather than focusing on the aftermath of crime (Glazebrook, 2010).

The main aim of this research was to contribute to the existing knowledge of risk assessment and risk of recidivism research in Australia, specifically the Tasmanian offender population. It has previously been discussed that there are differences in the Tasmanian offender population compared to other Australian states. This includes a relatively high rate of offenders, the lowest rate of incarcerated Indigenous offenders despite an increase in the rate of incarcerated Indigenous offenders, and a high proportion of offenders proceeded against by police (Grace et al., 2013; ABS, 2014). Building on the existing knowledge for Tasmanian offenders was achieved by conducting an evaluation of the LS/CMI within the Tasmanian criminal justice jurisdiction. The first study (chapter two) evaluated the LS/CMI by obtaining normative statistics and specific need profiles for Tasmanian offenders. This was completed by investigating the relationship between offenders' scores on the LS/CMI (including the total and subscale scores) and reoffending within a 12 month time period. A follow up evaluation (study two, chapter three) provided an examination of the LS/CMI psychometric properties, including determining its underlying construct structure as it is applied to Tasmanian offenders. The final aim of this research was to utilise the information gathered from the evaluations of the LS/CMI in order to develop a risk assessment that is sensitive to the needs of Tasmanian offenders. This risk assessment is titled the Australian Risk Need Inventory (ARNI) and was piloted within Tasmania, with a six-month follow-up period in order to examine its predictive efficacy. The main findings of this research are summarised below. Based on these results, it is argued that it is imperative to validate psychometric assessments within the population in which it is intended to be used in. The applied implications of this research are considered and the limitations of this research and areas for further research are discussed in this chapter.

Summary of the Studies

Study one (chapter two) examined the need profiles and the validity of the LS/CMI within a sample of Tasmanian offenders serving community based orders. The sample included 807 participants, comprised of 682 non-Indigenous offenders (569 males, 113 females) and 125 Indigenous offenders (96 males, 29 females). The results from this study indicated that there were significant Indigenous and sex differences. Indigenous males scored significantly higher across most LS/CMI subscales and the LS/CMI total score compared to non-Indigenous males. For non-Indigenous offenders, males scored significantly higher on the LS/CMI total score, as well as on the Criminal History and Alcohol/Drug Problem subscales compared to females.

The LS/CMI total score, the offenders' age and the majority of the LS/CMI subscale scores (Criminal History, Education/Employment, Family/Marital, Leisure/Recreation, Companions, Procriminal Attitude/Orientation, and Antisocial Pattern) were significantly correlated with reoffending for non-Indigenous male offenders. For non-Indigenous female offenders, only the offenders' age was significantly correlated with reoffending. The

Education/Employment subscale was positively correlated with reoffending for Indigenous male offenders. No significant correlations were obtained for Indigenous female offenders.

In relation to the predictive utility of the LS/CMI within this sample, a sequential logistic regression indicated that for non-Indigenous males and females an increase in age is associated with a decrease in the likelihood of reoffending. Further, for male offenders only, an increase in the LS/CMI total score is predictive of recidivism within a twelve month period. As predicted by previous research (for example, Andrew et al., 2011; Girard & Wormith, 2004, Andrews & Bonta, 2010), the Criminal History and Antisocial Pattern subscales were predictive of a greater likelihood of reoffending for male offenders. For both male and female offenders, a higher score on the Companions subscale was predictive of a decreased likelihood of reoffending, and this requires further exploration within this sample of offenders. No other significant findings were determined for female offenders. For both Indigenous male and female offenders, the sequential logistic regression was not significant for the LS/CMI total score. For Indigenous males, higher scores on the Leisure/Recreation subscale were predictive of a greater likelihood of reoffending. A subscale predictive analysis could not be interpreted for Indigenous females due to the low sample size. From the ROC analyses, the AUC was deemed a significant, but small effect for male offenders, and was not significant for female offenders. However, it is likely that the small sample size for female offenders within this study would have reduced the statistical power for the analyses and hence these findings should be interpreted with caution. However, the findings from study one suggest that the LS/CMI, as it is currently being used with the Tasmanian Department of Justice and Community Corrections, is struggling to predict recidivism within the Tasmanian offender population, but has a slightly better predictive ability for non-Indigenous male offenders.

There has been concern regarding the transferability of the Level of Service Inventories norms across jurisdictions, particularly to international criminal justice jurisdictions (Schlager & Simourd, 2007). As a result, study two (chapter three) examined the underlying latent structure of the LS/CMI using a principal axis factor analysis. The sample was comprised of 302 Tasmanian offenders (254 males, 48 females) who were completing community-based orders. Indigenous offenders were excluded from analyses due to their low representation within the sample.

The results from study two indicated that whilst the total score of the General Risk/Need section had excellent internal reliability at a subscale level the internal reliability is problematic. The internal reliability was at an acceptable level or above for five of the subscales, and poor or unacceptable for three of the eight subscales. In relation to the factor structure of the LS/CMI, a principal axis factor analysis produced a two-factor solution at a subscale level, indicative of a distinction between subscales related to criminal behaviour (including criminal attitudes), and subscales related to lifestyle and engagement. At an item level, a 12 factor solution was produced when all 43 LS/CMI items were included. When twelve items were removed due to low item-total correlation, an eight factor model was produced. The results of the factor analyses were consistent with previous studies (for example, Loza & Simourd, 1994; Hollin et al., 2003). In terms of predictive utility the majority of the subscales were able to predict reoffending within a twelve month period. The Criminal History, Family/Marital, and Companions subscales did not significantly predict reoffending. The LS/CMI total score did significantly predict reoffending. When the 12 identified LS/CMI items were removed and the revised total score obtained, the predictive utility was slightly improved. The results of this study provided consideration of items that may be considered problematic and should be investigated through further research, as well as identifying important factors within this population. For example, factor analysis identified that items relating to drug problems and generalised trouble loaded highly on the first factor. This is an important consideration for this offender sample and should be investigated, particularly in relation to the efficacy of drug and alcohol intervention programs that are accessible to offenders and whether successful completion of such programs significantly reduces future recidivism.

Study three (chapter four) builds on the work of the previous two studies (chapters two and three) by utilising the obtained information and developing a risk assessment instrument to be trialled within a Tasmanian offender population. There were two aims for this study. The first aim was to develop a revised risk assessment (ARNI) for use in an Australian offender population. The second aim of this study was to analyse the ARNI's psychometric properties, including examining its internal reliability at both an item and subscale level, the underlying factor structure, and its utility at predicting reoffending within a six-month pilot timeframe.

The ARNI was piloted on 301 offenders (237 males, 64 females) who were completing an incarceration sentence (29% of the sample) or had been referred to Community Corrections (71% of the sample). For the recidivism analysis, participants were selected from the original sample of 301 offenders. The criterion for inclusion in this phase of the study was that the offender must have at least a six-month period in which they were able to reoffend from the date of their original index offence, or six months from release from prison (including release on parole). This ensured that there were boundary limits around the length of the sentence and that all offenders' reoffending data was for the same period (Ringland, 2011a; Watkins, 2011). This resulted in recidivism data being collected for 200 participants (149 males, 51 females).

The findings from study three indicated that from the original 78-item pool, 45 items added the most information in the development of the ARNI as indicated from the corrected-item correlations. The Cronbach's alpha for the total score indicated an excellent level of internal reliability. At a subscale level, the internal reliability ranged from acceptable to excellent. For the three scales (Instrumental Aggression, Family Relationships and Educational Support, and Antisocial Cognitions) that achieved an acceptable level of internal reliability, it could be argued that a more comprehensive assessment for these scales is needed. In regard to the factor structure, at an item level principal axis factor analysis produced a ten factor solution which indicated an appropriate grouping of the ARNI items, following the central eight factors as outlined by Andrews and Bonta (2010). At a subscale level, a three factor solution was produced suggesting the broad categories of antisocial behaviour (past and present); protective employment, recreation and antisocial cognitions considerations; and lifestyle factors (substance use and educational achievement). In regard to the predictive utility of the ARNI, a ROC analysis determined that the ARNI total score was predictive of reoffending within a six-month follow-up period. At a subscale level, the ROC analyses indicated that five of the ten subscales were predictive of reoffending.

The Applied Implications of the Results

At present, there is no single preferred risk assessment within Australia; however there is emerging research that indicates that Australian correctional agencies are beginning to empirically validate the risk instruments utilised (for example, Hsu, 2010; Ringland, 2011a; Watkins, 2011). The Tasmanian Department of Justice currently uses the LS/CMI, which is one of the variants of the Level of Service Inventories theoretically based in personality and social learning theories (Andrews & Bonta, 1995). The Level of Service Inventories seek to predict rule violation (Andrews & Bonta, 1995; 2010; Bonta, 2007), which can include any type of re-offending, also referred to as general recidivism. This can include re-arrest, reincarceration, parole failures, or prison misconduct. The LS/CMI is scored by marking if 43 items are present or absent with information obtained from files and interviews. The total score indicates the offenders' level of recidivism risk by using the appropriate scale, and can also inform the intensity of the service (or supervision) that is required to decrease the likelihood of re-offending. Criminogenic areas of need (and strength factors) are identified through the dynamic questions incorporated on the subscales.

Despite the widespread use of the Level of Service Inventories, issues have been identified with their administrations, especially in international jurisdictions. Andrews and Bonta (1995; 2010) assert that the Level of Service Inventories are able to be applied to all offenders due to the general behavioural theories upon which these inventories are based. That is, all offenders have similar criminogenic risk/needs regardless of gender, race/Indigenous status, and offence type (Gendreau et al., 1996). However, many researchers have raised concerns that these inventories, and the GPCSL approach of understanding criminality, are not entirely gender- or race-neutral. More specifically, it is argued that the GPCSL approach ignores power imbalances in society's structure and the differing socialisation and experiences of males and females. This, in turn, affects the rate of occurrence of criminal behaviour including the impact of such factors as victimisation, parenting and family commitments, economic difficulties, and substance abuse (Reisig et al., 2006; Rettinger & Andrews, 2010; Smith et al., 2009). For example, whilst drug and alcohol use are commonly identified criminogenic needs, males are likely to engage in substance use/abuse for pleasure and self-gratification (Kelly & Welsh, 2008) whereas female offenders typically engage in substance use to alleviate physical and/or emotional pain (Langan & Pelissier, 2001; Byrne & Howells, 2002).

It can be speculated that micro-cultures may exist in different populations, and also within specific minority groups such as in the Indigenous communities (Hsu, 2010). This micro-culture can affect the population's views on certain types of behaviours including antisocial cognitions and engagement in crime. It is argued that the Level of Service

Inventories, including the theories and models of criminal behaviours, were developed based on an individualistic Western culture perspective (Lowenkamp et al., 2006; Whiteacre, 2006). As a result, this can affect the transferability and application of the normative data across jurisdictions on which the assessment was developed.

In particular, due to the differing offender populations across jurisdictions, the underlying constructs of the Level of Service Inventories may differ for, or not apply to, Australian offenders (Hsu, 2010). Hanson et al. (2013) argues that empirical actuarial risk tools are not designed to be internally consistent measures of a single latent construct. Rather, risk assessments are designed by selecting items based on their relationship with the designated outcome (for example, general recidivism) and are therefore criterion-referenced measures. Items may be retained in a risk assessment even when their relevance to recidivism is unknown but they are able to predict recidivism (Hanson & Thornton, 2003). As a result, risk assessments rarely contain homogenous items as a good risk scale will contain diverse psychologically meaningful risk factors that have been established as relating to engagement in antisocial/criminal behaviours and recidivism (Mann et al., 2010).

Exploring the theoretical nature of the underlying constructs of the risk assessment provides information about the appropriateness of the assessment for the population in which it is intended to be used. Exploring the latent constructs of the Level of Service Inventories within an Australian population allows insight into the relationship between the risk/need factors and how they contribute to antisocial behaviour. Various studies have investigated the LSI-R and how its subscales can be arranged into fewer factors. Studies have identified various factor structures internationally (see Andrews & Robinson, 1984; Arens et al., 1996; Loza & Simourd, 1994; Hollin et al., 2003; Palmer & Hollin, 2007). An Australian study by Hsu et al. (2011) examined the LSI-R at an item level which produced a five-factor solution for male offenders, and a four-factor solution for female offenders which were comparable.

The fifth factor for males had two items addressing acquaintances and friends not involved in criminal activity which could act as protective factors in regard to future offending.

Andrews and Bonta (1995) have noted that studies have not revealed a consistent factor structure for the LSI-R and suggest that the LSI-R's factor structure may depend upon the population and setting in which it is administered. Fluctuations between jurisdictions may occur requiring the instrument to be calibrated to the specific population and jurisdiction (Maurutto & Hannah-Moffat, 2007). Andrews and Bonta (1995) have acknowledged that the factor structure of the LSI-R may depend upon the population and setting in which it is administered due to inconsistent factor structures reported in various studies (e.g., Andrews & Robinson, 1984; Loza & Simourd, 1994; Hsu et al., 2011).

This is consistent with the results of the current findings, where the LS/CMI produces a two-factor solution at a subscale level in a population of Tasmanian offenders. It was evident that there was a distinction between subscales related to criminal behaviour (including attitudes) and family, and subscales related to lifestyle and engagement. At an item-level a more diverse 12 factor solution was obtained, which varied compared to the original LS/CMI subscales. However, the identified 12 factors still reflected the central eight RNR factors.

In regard to the 12 identified factors, it is an unusual finding that criminal history did not load onto the first factor as it has done in previous studies (e.g., Hsu et al., 2011). Rather, for this population of offenders, items relating to a current drug problem, its impact on several areas of functioning, and whether the offender displays a pattern of early and diverse antisocial behaviours loaded highly on the first factor. In contrast, items relating to an offender's past and present alcohol problem and law violations loaded onto the third factor. It can be argued, that for this sample of offenders, issues surrounding alcohol and drug problems are associated with recidivism and could be targeted through effective interventions.

Research indicates that the relationship between alcohol abuse and criminal behaviour is weaker in comparison to that between illicit drugs and crime (Andrews & Bonta, 2010), but both are important considerations when determining an offender's risk of recidivism. Alcohol abuse among offenders is quite high and offenders often report a high incidence of drinking at the time the offence occurred (Greenfeld & Henneberg, 2001). In considering this, research is available which demonstrates the effectiveness of providing interventions, using the RNR model, and a decrease in substance use behaviour and recidivism. For example, Prendergast (2009) reviewed research on the principles of effective correctional treatment and interventions, incorporating cognitive behavioural therapy, supervision/case management, and residential treatment. It was suggested that linking criminal justice agencies with treatment agencies and other community resources provided the best strategy for parolees and enabled them to reduce their drug use and crime and to successfully reintegrate into society. As a result, ensuring interventions are available to offenders with substance use problems, incorporating an inter-agency approach and providing continuing care may help to reduce recidivism in the Tasmanian offender population.

Items relating to employment loaded onto the second factor, and may also be an important consideration in relation to Tasmanian offenders. Tasmania has the highest unemployment rate in Australia of all the Australian states of 8.6%, increasing by 0.2% from previously estimated figures (ABS, 2013). It remains a challenge within the population to find adequate stable and permanent employment in order to meet an individual's financial needs. Andrews and Bonta (2010) indicate that stability of unemployment is a stronger risk factor than unemployment itself, with criminal behaviour increasing with frequent unemployment and longer durations of being unemployed. As a result, interventions may include ensuring offenders have adequate literacy and numeracy abilities, as well as aiding offenders in becoming job ready, through courses that teach offenders many aspects of employment, from searching for work, through to practising for job interviews and providing initial ongoing support once an offender is successful in obtaining employment.

It was not until the fourth factor that the big four of the central eight factors appeared. Items on this factor related to an offenders' procriminal attitude and orientation, or whether he/she was supportive towards crime and felt that his/her sentence or order was fair. Antisocial attitudes and cognitions are considered to be one of the best predictors of future criminal recidivism (Andrews & Bonta, 2010). As it is considered to be a dynamic factor, antisocial attitudes and cognitions can be addressed through targeted interventions and supervision through the reduction of antisocial thinking and gaining insight on risky thoughts and behaviours. Further, the offender can be encouraged to build and maintain social connections with anticriminal friends and associates for positive reinforcement of prosocial behaviours and attitudes to reduce recidivism risk.

In contrast, the ARNI produced a ten-factor model. The factors were named: Antisocial Associates; Adult Criminal History; Substance Use; Frequency of Employment; Juvenile Criminal History; Instrumental Aggression; Current Employment; Leisure, Recreation and Schooling History; Antisocial Cognitions; and Familial Relationships and Educational Support. These factors are reflective of the central eight risk/need factors outlined by Andrews and Bonta (2010) and are highly correlated with future recidivism. The construct structure also recognised instrumental aggression as a subscale, indentifying this as a distinct area for Tasmanian offenders that has not been incorporated on the LS/CMI. The contrast between the findings from the LS/CMI and the ARNI for the Tasmanian offender sample highlights the importance of evaluating international risk assessments within local populations, and that such instruments are required to be validated within the target offender samples.

Predictive Ability and Internal Consistency

The predictive ability of the LS/CMI and the ARNI was examined throughout this research. For the LS/CMI, a twelve month follow-up timeframe was utilised. However, due to time limitations, a six-month follow-up period could only be conducted for the pilot of the ARNI. In all instances, the LS/CMI and ARNI were predictive of general recidivism. In study one (chapter two) the LS/CMI total score demonstrated a fair predictive validity for males, but was not predictive for females. In study two (chapter three) the LS/CMI total score demonstrated a fair predictive validity of reoffending in a sample consisting of both males and females. In study three (chapter four), the ARNI demonstrated a fair predictive validity for recidivism in a sample consisting of both males and females. However, for the ARNI it could be hypothesised that its predictive utility would increase if a longer follow-up period was conducted as only a six-month time frame could be utilised, whereas for the studies exploring the predictive utility of the LS/CMI a 12-month timeframe was utilised.

Despite this, what separates the ARNI from the LS/CMI for use within a Tasmanian offender population is that the ARNI's subscales consistently achieved an acceptable (or higher) level of internal reliability. In contrast, the internal reliability of the LS/CMI's subscales was variable with some of the subscales achieving poor or unacceptable levels as determined by Cronbach's alpha. Whilst it could be argued that the ARNI's total score, and not the subscale score, is used to inform an offender's level or recidivism risk (Andrews & Bonta, 1995; Andrews et al., 2004), the subscales are used to inform case planning decisions by identifying specific criminogenic risk and needs. Therefore, regardless of predictive utility, the subscales should be psychometrically sound in order to be used in such a manner. If they are not, resources may not be employed or utilised in a manner that effectively targets and reduces the impact of these criminogenic areas. Rather, under- or over- estimating these risk/needs due to inaccurate measurement methods may result in increasing recidivism risk as these needs aren't being adequately addressed, or incorrectly targeted, through intervention (Andrews & Bonta, 2010).

Limitations and Future Research Directions

The research presented in this dissertation is the first to examine the LS/CMI as it is used within the Tasmanian criminal justice system. Further, this research also adds to knowledge in Australia on the utility of using the LS/CMI within Australia in general. This is an emerging field within Australia as the state criminal justice agencies are beginning to examine the use of the Level of Service variants and their benefits and limitations in using these risk instruments outside America and Canada. The information obtained by examining the LS/CMI was then used to aid in the development of the ARNI for use within the Tasmanian offender population. However, there are a number of issues that must be considered when interpreting the results arising from this research. Future research directions to address these limitations are discussed.

Defining recidivism. The current research defined reoffending as a re-offence that leads to the offender coming back into contact with the correctional agency. This may under-represent the true level of reoffending that is occurring; for example, rule violation on community orders in which an offender receives a warning, or offending that goes undetected or unreported in the community. Therefore, future research may wish to examine the rates of reoffending by collecting, for example, self-report data, as well as data from corrections (including both formal convictions and cautions/breaches of orders) to determine if this has an impact on the prediction of recidivism.

Data from correctional agencies. The data for studies one and two were obtained from community corrections, and study three attempted to diversify this sample by obtaining data from both community corrections and prison populations. However, for all the current studies data was only obtained from one state (Tasmania). Therefore, all results obtained from these studies can only be applied to the present Tasmanian offender sample. Future research will need to determine if the present results are representative across all Australian offenders, and not from a single correctional agency.

Gender and ethnicity/race. The current research could not effectively examine the differences in the risk/needs and predictive utility of the LS/CMI and the ARNI in female and Indigenous offenders. This was due to their low representation within the current samples. Whilst study one attempted to examine the differences between Indigenous and non-Indigenous male and female offenders, the results for the female and Indigenous offenders needs to be interpreted with caution due to their low representation. It is generally accepted that male offenders are over-represented in the criminal justice system in comparison to female offenders. Whilst women may be involved in the full range of criminal behaviours, their involvement in crime is often considered to be of a less serious nature than men (for example, women commit fewer serious assaults than men, but are commonly charged with minor assault and property offences such as shoplifting) and their offending tends to be of a shorter duration (Australian Institute of Health and Welfare, 2012). Research indicates that Indigenous offenders tend to be overrepresented in criminal justice agencies. However, Tasmania has the second lowest rate of incarcerated Indigenous offenders, with the Australia Capital Territory having the lowest rate, at the end of financial year in 2009 and 2012 (Grace et al., 2012). The 2011 Tasmanian census data indicated that Aboriginal and Torres Strait Islanders comprise almost 4% of the total Tasmanian population (ABS, 2012). The sample obtained in study one indicated that 15.5% of the sample identified as being Indigenous, reflecting an over-representation in the criminal justice system. Whilst the risk factors for Indigenous offending within Australia are largely similar to those for non-Indigenous offenders (such as being young, male, of low socio-economic status, poor education, unemployment and substance abuse), other risk factors are present that are specific to Indigenous people. These risk factors include forced removals, dependence on government, and racism (Allard, 2010). This point is important when considerations are given to the generalisation of any risk assessment measures that could be incorporated into criminal justice agencies.

Whilst it is argued that the Level of Service Inventories are race- and gender-neutral, other research argues that females and Indigenous offenders have different risks/needs which may impact upon the results of risk assessments (for a full discussion see Hannah-Moffat, 2006; 2009). Therefore, it is recommended that the current research is followed up by obtaining a larger sample of female and Indigenous offenders in order to determine if there are significant between-group comparisons for both gender and Indigenous status. This is an important consideration as correctional justice agencies may be either under- or over-classifying female or Indigenous offenders' recidivism risk if the assessment information is not applicable, indicating that normative information is specifically required for these groups of offenders. Further, if significant differences are present, these can be tailored and addressed in sentencing considerations and case management plans.

Sample size and characteristics. The sample utilised in this research could be considered to be a medium- to high-risk heterogeneous sample, with a large proportion of offenders committing violent (minor assault) and traffic offences. Whilst it was attempted to diversify the sample in study three by collecting data from both the prison and community corrections, a large proportion of offenders was obtained from Community Corrections. This could indicate a population with lower severity in their offences in comparison to an incarcerated population sample. Because of this, the results obtained from the three studies may not be applicable across all offender sentencing categories and may be biased towards offenders classified as being medium to high risk. Therefore, it is proposed that future research should aim to increase the offender sample size (which may include collecting data over two or more years). Further, research comparing offenders who have been incarcerated with those completing community orders is required to determine if there are any significant differences between these two populations.

Time period for follow-up. A twelve month follow up period was conducted on the LS/CMI in studies one and two (chapters two and three respectively). Due to the time constraints of this doctoral research, a six month follow-up period was conducted for the pilot of the ARNI (as detailed in study three, chapter four). It is recommended that a longer follow up period is conducted, particularly on the ARNI. This could include conducting analyses at 12-month, 24-month, and five-year periods to determine if the reoffending data and predictive utility of the ARNI remains stable. Further, such analyses will also provide information as to whether offenders continue to be at risk of reoffending or if there is a time period in which reoffending becomes stable or less likely to occur past a given time period. Identifying such a time period could provide guidelines on when intensive services are required and likely to be the most effective in order to deter offenders from reoffending.

Distinction in types of reoffending. It is important to match the risk assessment for the specific behaviour that the agency/assessor is interested in predicting. The LS/CMI is a general risk assessment instrument to be used to measure an offender’s recidivism risk for any type of re-offending. However, if the assessor wished to measure a specific behaviour, a specialised instrument will need to be selected. Future research could assess the predictive validity of the LS/CMI and ARNI in predicting both general offending and specific offending, such as violent recidivism.

Limiting risk assessment to one scale. By only administering one risk assessment to inform sentencing and case planning decisions, correctional agencies may be trying to measure a complex area too simplistically. Doing so ignores the more subtle links between the identified factors and the factors' relationship to recidivism risk. Perhaps what is needed is to re-evaluate the methodologies employed by criminal justice agencies and acknowledge that a more comprehensive risk assessment battery will take longer than one general risk assessment. The information gathered from a comprehensive risk assessment battery will provide more rich and meaningful information that will ensure individualised case planning and may increase the likelihood of an offender desisting from future criminal conduct.

Effect of intervention on recidivism. The finding that some LS/CMI and ARNI subscales did not predict reoffending may have implications for interventions aimed at reducing an offenders recidivism risk. For example, programs or interventions aimed at addressing family/marital or leisure/recreation domains may not be effective in reducing recidivism risk, whereas interventions that address substance use, education/employment and antisocial cognitions may be of greater benefit in terms of reducing reoffending. Further, in terms of predicting recidivism, it is unknown what effect interventions had on an offenders' score on both the LS/CMI and the ARNI. As a result, the relationships between scores on these risk assessments and recidivism may have been masked or affected by offenders receiving increased supervision and interventions. Offenders who are categorised as medium to high risk receive more intensive intervention than offenders classified as lower risk, which may have resulted in reduced reoffending in the higher risk offenders. Future research may wish to examine the rates of reoffending by collecting, for example, data relating to whether offenders receive an intervention, and their successful completion of an intervention, and the effect this has on follow-up recidivism rates over differing periods of time (for example, comparison reoffending rates at six-, twelve-, and twenty-four month time-frames).

Conclusions and Future Directions

The research presented in this thesis demonstrates that the complexity of criminal behaviour will always be more intricate than assessment measures and case/intervention plans can cater for. Regardless of this, actuarial assessment measures are preferred to unstructured clinical judgements and provide correctional agencies with a starting point in identifying an offender's criminogenic risks and needs. This information can inform an offender's sentence or community order conditions, as well as interventions or programs that an offender may be involved in as part of their case planning. Whilst the use of risk assessments is widespread throughout the world, information regarding their use within Tasmania is currently lacking. As such, this research highlights the predictive validity of the LS/CMI and outlines the development and pilot of the ARNI designed especially for a Tasmanian offender population.

In regard to the LS/CMI, its use within an Australian criminal justice jurisdiction remains relatively unsubstantiated. To the best of this author's knowledge, this research is the first to examine its predictive utility within an Australian offender population. However, research is available that examines the LS/CMI's predecessor (for example, Hsu, 2010; Ringland, 2011a; Watkins, 2011). The data for the current examination of the LS/CMI was obtained from only one correctional agency (Tasmania) and primarily from a community correctional agency. Therefore, there is the possibility that this research may only be representative of the singular sampled agency and may not be reflective of other Australian jurisdictions, or even incarcerated offenders within Tasmania. Future research should explore and validate the LS/CMI in both community corrections and prison agencies, as well as compare data obtained from different states to ensure that the results are generalisable across Australian offenders.

Lastly, this research presented a pilot of the ARNI within the Tasmanian offender population. The majority of offenders sampled comprised those who had been referred to community corrections, with a small proportion of offenders being incarcerated. Due to timeframe restrictions, data could only be collected that allowed a six-month reoffending timeframe for 200 of the 301 offenders sampled. As a result it is recommended that the ARNI continues to be evaluated within this offender population. This includes conducting research by extending the sample of offenders, comparing offenders across correctional agencies (including community corrections and the prison), comparing types of offenders (such as violent, general, or rule violation offending), as well as comparing data between female and Indigenous offenders). Further, extending the timeframe follow-up from six months to 12-month, 24-month, and five-year intervals will ensure the ARNI remains a valid risk assessment within this population.

The results of this research have provided normative statistics and criminogenic need characteristics for Australian offenders in general, specifically providing information about the Tasmanian offender population. The identification of the subscales (reflecting latent constructs) in the ARNI provide information on the needs of these offenders. This in turn can inform future research in order to develop more targeted intervention strategies to reduce recidivism. It also provides information in regard to areas not previously assessed, primarily instrumental aggression, and this may be important for the Tasmanian offender population in which many minor assaults are occurring, as well as the smaller population size compared to other Australian states.

The current research presented in this dissertation has practical implications for reducing reoffending within Australia and helping to identify offenders with a heightened recidivism risk. Increasing the sophistication of risk assessments, as well as ensuring they are sensitive and reflective of the target population needs, will make certain that the type of information obtained is able to be utilised for sentencing, case planning and program eligibility. Selecting the right, or preferred, assessment for offenders is not an easy task. As a result, it is suggested that a selection of a general recidivism assessment combined with more tailored/specific assessments would be recommended as a best practice approach. This argument is made primarily due to the complex nature of criminality and that restricting an offender's recidivism risk level to one assessment may not be adequately capturing their criminogenic risks/needs. A comprehensive battery would provide more information to ensure individualised case planning and would have the benefits of reducing recidivism risk, including better management and care of these offenders. This information can lead agencies to utilise this information to aid in the prevention of crime.

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Appendix A

SPSS Output for Chapter 2 (Study 1)

Frequencies of Indigenous males and females across risk categories

Total.desc[a]

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	High	44	45.8	45.8	45.8
	Low	4	4.2	4.2	50.0
	medium	29	30.2	30.2	80.2
	very high	19	19.8	19.8	100.0
	Total	96	100.0	100.0	

a. Sex = Male

Total.desc[a]

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	High	12	41.4	41.4	41.4
	Low	1	3.4	3.4	44.8
	medium	9	31.0	31.0	75.9
	very high	7	24.1	24.1	100.0
	Total	29	100.0	100.0	

a. Sex = Female

Frequencies of non-Indigenous males and females across risk categories

Total.desc

Sex			Frequency	Percent	Valid Percent	Cumulative Percent
Male	Valid	high	215	37.8	37.8	37.8
		Low	56	9.8	9.8	47.6
		medium	231	40.6	40.6	88.2
		very high	63	11.1	11.1	99.3
		very low	4	.7	.7	100.0
		Total	569	100.0	100.0	
Female	Valid	high	31	27.4	27.4	27.4
		Low	15	13.3	13.3	40.7
		medium	55	48.7	48.7	89.4
		very high	10	8.8	8.8	98.2

	very low	2	1.8	1.8	100.0
	Total	113	100.0	100.0	

Means and standard deviations for LS/CMI subscale and total score

Indigenous Males:

Descriptive Statistics[a]

	N	Minimum	Maximum	Mean	Std. Deviation
Criminal History	96	0	8	5.01	1.786
Educ/Employ	96	0	9	5.00	2.895
Fam/Marital	96	0	4	1.86	1.130
Lei/Recre	96	0	2	1.49	.680
Companions	96	0	4	2.18	1.399
Alco/Drug	96	0	8	4.64	2.191
Proatt/Orient	96	0	4	1.27	1.349
AntiPatt	96	0	4	1.54	1.114
Total	96	5	40	23.00	7.660
Valid N (listwise)	96				

a. Sex = Male

Non-Indigenous Males:

Descriptive Statistics[a]

	N	Minimum	Maximum	Mean	Std. Deviation
Total	569	2	41	19.73	7.601
Criminal History	569	0	8	4.63	1.710
Educ/Employ	569	0	9	4.27	2.734
Fam/Marital	569	0	9	1.55	1.124
Lei/Recre	569	0	2	1.34	.728
Companions	569	0	4	1.80	1.335
Alco/Drug	569	0	8	4.10	2.141
Proatt/Orient	569	0	4	.85	1.163
AntiPatt	569	0	4	1.16	1.091
Valid N (listwise)	569				

a. Sex = Male

Indigenous Females:

Descriptive Statistics[a]

	N	Minimum	Maximum	Mean	Std. Deviation
Criminal History	29	0	8	4.48	2.081
Educ/Employ	29	1	9	4.86	2.949
Fam/Marital	29	0	4	2.24	1.300
Lei/Recre	29	0	2	1.76	.511
Companions	29	0	4	2.59	1.427
Alco/Drug	29	0	7	4.38	1.699
Proatt/Orient	29	0	4	1.10	1.235
AntiPatt	29	0	3	1.83	1.104
Total	29	10	37	23.17	7.378
Valid N (listwise)	29				

a. Sex = Female

Non-Indigenous Females:

Descriptive Statistics[a]

	N	Minimum	Maximum	Mean	Std. Deviation
Total	113	3	36	18.02	7.511
Criminal History	113	0	8	3.92	1.582
Educ/Employ	113	0	9	3.86	2.464
Fam/Marital	113	0	7	1.77	1.261
Lei/Recre	113	0	2	1.34	.739
Companions	113	0	4	1.87	1.326
Alco/Drug	113	0	8	3.66	2.161
Proatt/Orient	113	0	4	.78	1.092
AntiPatt	113	0	3	1.06	.966
Valid N (listwise)	113				

a. Sex = Female

Criminogenic Need Profile:

ANOVA Indigenous

ANOVA

Total

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.662	1	.662	.011	.915
Within Groups	7098.138	123	57.708		
Total	7098.800	124			

ANOVA Non-Indigenous

ANOVA

Total

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	276.776	1	276.776	4.809	.029
Within Groups	39133.824	680	57.550		
Total	39410.600	681			

MANOVA Indigenous

Between-Subjects Factors

		Value Label	N
Sex	1	Male	96
	2	Female	29

Descriptive Statistics

	Sex	Mean	Std. Deviation	N
Criminal History	Male	5.01	1.786	96
	Female	4.48	2.081	29
	Total	4.89	1.863	125
Educ/Employ	Male	5.00	2.895	96
	Female	4.86	2.949	29
	Total	4.97	2.896	125
Fam/Marital	Male	1.86	1.130	96
	Female	2.24	1.300	29
	Total	1.95	1.177	125
Lei/Recre	Male	1.49	.680	96
	Female	1.76	.511	29
	Total	1.55	.653	125
Companions	Male	2.18	1.399	96
	Female	2.59	1.427	29
	Total	2.27	1.411	125
Alco/Drug	Male	4.64	2.191	96
	Female	4.38	1.699	29
	Total	4.58	2.084	125
Proatt/Orient	Male	1.27	1.349	96
	Female	1.10	1.235	29
	Total	1.23	1.321	125
AntiPatt	Male	1.54	1.114	96
	Female	1.83	1.104	29

Total	1.61	1.114	125

Box's Test of Equality of Covariance Matrices[a]

Box's M	33.323
F	.823
df1	36
df2	9392.670
Sig.	.763

Tests the null hypothesis that the observed covariance matrices of the dependent variables are equal across groups.

a. Design: Intercept + Sex

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Intercept	Pillai's Trace	.918	161.712[b]	8.000	116.000	.000	.918
	Wilks' Lambda	.082	161.712[b]	8.000	116.000	.000	.918
	Hotelling's Trace	11.153	161.712[b]	8.000	116.000	.000	.918
	Roy's Largest Root	11.153	161.712[b]	8.000	116.000	.000	.918
Sex	Pillai's Trace	.126	2.097[b]	8.000	116.000	.041	.126
	Wilks' Lambda	.874	2.097[b]	8.000	116.000	.041	.126
	Hotelling's Trace	.145	2.097[b]	8.000	116.000	.041	.126
	Roy's Largest Root	.145	2.097[b]	8.000	116.000	.041	.126

Levene's Test of Equality of Error Variances[a]

	F	df1	df2	Sig.
Criminal History	.682	1	123	.410
Educ/Employ	.031	1	123	.860
Fam/Marital	2.761	1	123	.099
Lei/Recre	11.590	1	123	.001
Companions	.441	1	123	.508
Alco/Drug	2.422	1	123	.122
Proatt/Orient	3.531	1	123	.063
AntiPatt	.006	1	123	.938

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Design: Intercept + Sex

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	Criminal History	6.201[a]	1	6.201	1.798	.182	.014
	Educ/Employ	.424[b]	1	.424	.050	.823	.000
	Fam/Marital	3.162[c]	1	3.162	2.308	.131	.018
	Lei/Recre	1.612[d]	1	1.612	3.865	.052	.030
	Companions	3.728[e]	1	3.728	1.887	.172	.015
	Alco/Drug	1.461[f]	1	1.461	.335	.564	.003
	Proatt/Orient	.624[g]	1	.624	.356	.552	.003
	AntiPatt	1.821[h]	1	1.821	1.474	.227	.012
Intercept	Criminal History	2007.161	1	2007.161	581.949	.000	.826
	Educ/Employ	2166.184	1	2166.184	256.329	.000	.676
	Fam/Marital	375.482	1	375.482	274.010	.000	.690
	Lei/Recre	234.988	1	234.988	563.422	.000	.821
	Companions	505.328	1	505.328	255.758	.000	.675
	Alco/Drug	1809.941	1	1809.941	414.516	.000	.771
	Proatt/Orient	125.552	1	125.552	71.612	.000	.368
	AntiPatt	252.829	1	252.829	204.630	.000	.625
Sex	Criminal History	6.201	1	6.201	1.798	.182	.014
	Educ/Employ	.424	1	.424	.050	.823	.000
	Fam/Marital	3.162	1	3.162	2.308	.131	.018
	Lei/Recre	1.612	1	1.612	3.865	.052	.030
	Companions	3.728	1	3.728	1.887	.172	.015
	Alco/Drug	1.461	1	1.461	.335	.564	.003
	Proatt/Orient	.624	1	.624	.356	.552	.003
	AntiPatt	1.821	1	1.821	1.474	.227	.012
Error	Criminal History	424.231	123	3.449			
	Educ/Employ	1039.448	123	8.451			
	Fam/Marital	168.550	123	1.370			
	Lei/Recre	51.300	123	.417			
	Companions	243.024	123	1.976			
	Alco/Drug	537.067	123	4.366			
	Proatt/Orient	215.648	123	1.753			
	AntiPatt	151.971	123	1.236			
Total	Criminal History	3417.000	125				
	Educ/Employ	4125.000	125				
	Fam/Marital	648.000	125				
	Lei/Recre	354.000	125				
	Companions	892.000	125				
	Alco/Drug	3156.000	125				
	Proatt/Orient	406.000	125				

	AntiPatt	477.000	125				
Corrected Total	Criminal History	430.432	124				
	Educ/Employ	1039.872	124				
	Fam/Marital	171.712	124				
	Lei/Recre	52.912	124				
	Companions	246.752	124				
	Alco/Drug	538.528	124				
	Proatt/Orient	216.272	124				
	AntiPatt	153.792	124				

Estimated Marginal Means

Sex

Dependent Variable	Sex	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Criminal History	Male	5.010	.190	4.635	5.386
	Female	4.483	.345	3.800	5.165
Educ/Employ	Male	5.000	.297	4.413	5.587
	Female	4.862	.540	3.794	5.931
Fam/Marital	Male	1.865	.119	1.628	2.101
	Female	2.241	.217	1.811	2.672
Lei/Recre	Male	1.490	.066	1.359	1.620
	Female	1.759	.120	1.521	1.996
Companions	Male	2.177	.143	1.893	2.461
	Female	2.586	.261	2.070	3.103
Alco/Drug	Male	4.635	.213	4.213	5.058
	Female	4.379	.388	3.611	5.147
Proatt/Orient	Male	1.271	.135	1.003	1.538
	Female	1.103	.246	.617	1.590
AntiPatt	Male	1.542	.113	1.317	1.766
	Female	1.828	.206	1.419	2.236

MANOVA Non-Indigenous

Between-Subjects Factors

		Value Label	N
Sex	1	Male	569
	2	Female	113

Descriptive Statistics

	Sex	Mean	Std. Deviation	N
Criminal History	Male	4.63	1.710	569
	Female	3.92	1.582	113
	Total	4.51	1.709	682
Educ/Employ	Male	4.27	2.734	569
	Female	3.86	2.464	113
	Total	4.20	2.694	682
Fam/Marital	Male	1.55	1.124	569
	Female	1.77	1.261	113
	Total	1.58	1.149	682
Lei/Recre	Male	1.34	.728	569
	Female	1.34	.739	113
	Total	1.34	.730	682
Companions	Male	1.80	1.335	569
	Female	1.87	1.326	113
	Total	1.81	1.333	682
Alco/Drug	Male	4.10	2.141	569
	Female	3.66	2.161	113
	Total	4.03	2.148	682
Proatt/Orient	Male	.85	1.163	569
	Female	.78	1.092	113
	Total	.84	1.151	682
AntiPatt	Male	1.16	1.091	569
	Female	1.06	.966	113
	Total	1.14	1.072	682

Box's Test of Equality of Covariance Matrices[a]

Box's M	38.013
F	1.028
df1	36
df2	137434.020
Sig.	.422

Tests the null hypothesis that the observed covariance matrices of the dependent variables are equal across groups.

a. Design: Intercept + Sex

Multivariate Tests[c]

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[b]
Intercept	Pillai's Trace	.868	553.182[a]	8.000	673.000	.000	.868	4425.458	1.000
	Wilks' Lambda	.132	553.182[a]	8.000	673.000	.000	.868	4425.458	1.000
	Hotelling's Trace	6.576	553.182[a]	8.000	673.000	.000	.868	4425.458	1.000
	Roy's Largest Root	6.576	553.182[a]	8.000	673.000	.000	.868	4425.458	1.000
Sex	Pillai's Trace	.048	4.234[a]	8.000	673.000	.000	.048	33.868	.995
	Wilks' Lambda	.952	4.234[a]	8.000	673.000	.000	.048	33.868	.995
	Hotelling's Trace	.050	4.234[a]	8.000	673.000	.000	.048	33.868	.995
	Roy's Largest Root	.050	4.234[a]	8.000	673.000	.000	.048	33.868	.995

a. Exact statistic

b. Computed using alpha = .05

c. Design: Intercept + Sex

Levene's Test of Equality of Error Variances[a]

	F	df1	df2	Sig.
Criminal History	4.228	1	680	.040
Educ/Employ	5.443	1	680	.020
Fam/Marital	2.135	1	680	.144
Lei/Recre	.057	1	680	.811
Companions	.000	1	680	.984
Alco/Drug	.436	1	680	.509
Proatt/Orient	.495	1	680	.482
AntiPatt	3.206	1	680	.074

Tests the null hypothesis that the error variance of the dependent variable is equal across groups. a. Design: Intercept + Sex

Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[b]
Corrected Model	Criminal History	47.367[a]	1	47.367	16.594	.000	.024	16.594	.982
	Educ/Employ	16.159[c]	1	16.159	2.230	.136	.003	2.230	.320
	Fam/Marital	4.703[d]	1	4.703	3.573	.059	.005	3.573	.471
	Lei/Recre	.000[e]	1	.000	.000	.988	.000	.000	.050
	Companions	.454[f]	1	.454	.255	.614	.000	.255	.080
	Alco/Drug	17.815[g]	1	17.815	3.876	.049	.006	3.876	.502
	Proatt/Orient	.511[h]	1	.511	.386	.535	.001	.386	.095
	AntiPatt	.905[i]	1	.905	.788	.375	.001	.788	.144
Intercept	Criminal History	6891.133	1	6891.133	2414.156	.000	.780	2414.156	1.000
	Educ/Employ	6232.675	1	6232.675	860.288	.000	.559	860.288	1.000
	Fam/Marital	1036.961	1	1036.961	787.829	.000	.537	787.829	1.000
	Lei/Recre	673.965	1	673.965	1264.496	.000	.650	1264.496	1.000
	Companions	1266.454	1	1266.454	712.452	.000	.512	712.452	1.000
	Alco/Drug	5680.267	1	5680.267	1235.745	.000	.645	1235.745	1.000
	Proatt/Orient	250.833	1	250.833	189.294	.000	.218	189.294	1.000
	AntiPatt	465.421	1	465.421	405.226	.000	.373	405.226	1.000
Sex	Criminal History	47.367	1	47.367	16.594	.000	.024	16.594	.982
	Educ/Employ	16.159	1	16.159	2.230	.136	.003	2.230	.320
	Fam/Marital	4.703	1	4.703	3.573	.059	.005	3.573	.471
	Lei/Recre	.000	1	.000	.000	.988	.000	.000	.050
	Companions	.454	1	.454	.255	.614	.000	.255	.080
	Alco/Drug	17.815	1	17.815	3.876	.049	.006	3.876	.502

	Proatt/Orient	.511	1	.511	.386	.535	.001	.386	.095
	AntiPatt	.905	1	.905	.788	.375	.001	.788	.144
Error	Criminal History	1941.039	680	2.854					
	Educ/Employ	4926.511	680	7.245					
	Fam/Marital	895.034	680	1.316					
	Lei/Recre	362.434	680	.533					
	Companions	1208.766	680	1.778					
	Alco/Drug	3125.710	680	4.597					
	Proatt/Orient	901.068	680	1.325					
	AntiPatt	781.013	680	1.149					
Total	Criminal History	15871.000	682						
	Educ/Employ	16995.000	682						
	Fam/Marital	2610.000	682						
	Lei/Recre	1582.000	682						
	Companions	3442.000	682						
	Alco/Drug	14200.000	682						
	Proatt/Orient	1383.000	682						
	AntiPatt	1674.000	682						
Corrected Total	Criminal History	1988.406	681						
	Educ/Employ	4942.670	681						
	Fam/Marital	899.736	681						
	Lei/Recre	362.434	681						
	Companions	1209.220	681						
	Alco/Drug	3143.525	681						
	Proatt/Orient	901.579	681						
	AntiPatt	781.918	681						

a. R Squared = .024 (Adjusted R Squared = .022)

b. Computed using alpha = .05

c. R Squared = .003 (Adjusted R Squared = .002)

d. R Squared = .005 (Adjusted R Squared = .004)

e. R Squared = .000 (Adjusted R Squared = -.001)

f. R Squared = .000 (Adjusted R Squared = -.001)

g. R Squared = .006 (Adjusted R Squared = .004)

h. R Squared = .001 (Adjusted R Squared = -.001)

i. R Squared = .001 (Adjusted R Squared = .000)

Estimated Marginal Means

Sex

Dependent Variable	Sex	Mean	Std. Error	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
Criminal History	Male	4.629	.071	4.490	4.768
	Female	3.920	.159	3.608	4.232
Educ/Employ	Male	4.272	.113	4.051	4.494
	Female	3.858	.253	3.361	4.356
Fam/Marital	Male	1.547	.048	1.452	1.641
	Female	1.770	.108	1.558	1.982
Lei/Recre	Male	1.337	.031	1.277	1.398
	Female	1.336	.069	1.201	1.471
Companions	Male	1.798	.056	1.688	1.908
	Female	1.867	.125	1.621	2.114
Alco/Drug	Male	4.098	.090	3.922	4.275
	Female	3.664	.202	3.268	4.060
Proatt/Orient	Male	.852	.048	.758	.947
	Female	.779	.108	.566	.991
AntiPatt	Male	1.160	.045	1.072	1.248
	Female	1.062	.101	.864	1.260

Bivariate Correlations
Indigenous Males

		Total	CH	EE	FM	LR	C	ADP	PAO	AP	Age in 2010	roc.reoffend 12mth
	Correlation Coefficient	1.000	.466**	.708**	.466**	.523**	.623**	.534**	.576**	.741**	-.188	.178
Total	Sig. (2-tailed)	.	.000	.000	.000	.000	.000	.000	.000	.000	.067	.082
	N	96	96	96	96	96	96	96	96	96	96	96
	Correlation Coefficient	.466**	1.000	.181	.032	.033	.206*	.075	.242*	.422**	.157	.201
Criminal History	Sig. (2-tailed)	.000	.	.078	.757	.748	.044	.470	.018	.000	.126	.050
	N	96	96	96	96	96	96	96	96	96	96	96
	Correlation Coefficient	.708**	.181	1.000	.220*	.469**	.304**	.178	.238*	.462**	-.517**	.210*
Educ/Employ	Sig. (2-tailed)	.000	.078	.	.031	.000	.003	.083	.019	.000	.000	.040
	N	96	96	96	96	96	96	96	96	96	96	96
	Correlation Coefficient	.466**	.032	.220*	1.000	.189	.178	.260*	.297**	.347**	.081	.026
Fam/Marital	Sig. (2-tailed)	.000	.757	.031	.	.066	.082	.011	.003	.001	.433	.804
	N	96	96	96	96	96	96	96	96	96	96	96
	Correlation Coefficient	.523**	.033	.469**	.189	1.000	.281**	.220*	.203*	.352**	-.337**	-.069
Lei/Recre	Sig. (2-tailed)	.000	.748	.000	.066	.	.006	.031	.047	.000	.001	.504
	N	96	96	96	96	96	96	96	96	96	96	96
	Correlation Coefficient	.623**	.206*	.304**	.178	.281**	1.000	.359**	.313**	.436**	-.098	.042
Companions	Sig. (2-tailed)	.000	.044	.003	.082	.006	.	.000	.002	.000	.341	.684
	N	96	96	96	96	96	96	96	96	96	96	96
	Correlation Coefficient	.534**	.075	.178	.260*	.220*	.359**	1.000	.145	.141	.095	.017
Alco/Drug	Sig. (2-tailed)	.000	.470	.083	.011	.031	.000	.	.160	.172	.355	.873
	N	96	96	96	96	96	96	96	96	96	96	96

Proatt/Orient	Correlation Coefficient	.576**	.242*	.238*	.297**	.203*	.313**	.145	1.000	.645**	-.008	.180
	Sig. (2-tailed)	.000	.018	.019	.003	.047	.002	.160	.	.000	.935	.079
	N	96	96	96	96	96	96	96	96	96	96	96
AntiPatt	Correlation Coefficient	.741**	.422**	.462**	.347**	.352**	.436**	.141	.645**	1.000	-.152	.119
	Sig. (2-tailed)	.000	.000	.000	.001	.000	.000	.172	.000	.	.140	.250
	N	96	96	96	96	96	96	96	96	96	96	96
Age in 2010	Correlation Coefficient	-.188	.157	-.517**	.081	-.337**	-.098	.095	-.008	-.152	1.000	-.252*
	Sig. (2-tailed)	.067	.126	.000	.433	.001	.341	.355	.935	.140	.	.013
	N	96	96	96	96	96	96	96	96	96	96	96
roc.reoffend12mth	Correlation Coefficient	.178	.201	.210*	.026	-.069	.042	.017	.180	.119	-.252*	1.000
	Sig. (2-tailed)	.082	.050	.040	.804	.504	.684	.873	.079	.250	.013	.
	N	96	96	96	96	96	96	96	96	96	96	96

Non-Indigenous Males

Correlations[a]

		Total	Criminal History	Educ/ Employ	Fam/ Marital	Lei/ Recre	Companions	Alco/ Drug	Proatt/ Orient	AntiPatt	Age in 2010	roc.reoffend 12mth
Total	Pearson Correlation	1	.568**	.730**	.484**	.475**	.705**	.611**	.524**	.778**	-.192**	.231**
	Sig. (2-tailed)		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	569	569	569	569	569	569	569	569	569	569	567
Criminal History	Pearson Correlation	.568**	1	.269**	.206**	.099*	.351**	.183**	.204**	.471**	.082	.139**
	Sig. (2-tailed)	.000		.000	.000	.018	.000	.000	.000	.000	.052	.001
	N	569	569	569	569	569	569	569	569	569	569	567
Educ/Employ	Pearson Correlation	.730**	.269**	1	.248**	.391**	.414**	.266**	.193**	.457**	-.312**	.213**
	Sig. (2-tailed)	.000	.000		.000	.000	.000	.000	.000	.000	.000	.000
	N	569	569	569	569	569	569	569	569	569	569	567
Fam/Marital	Pearson Correlation	.484**	.206**	.248**	1	.153**	.269**	.238**	.220**	.335**	.012	.101*
	Sig. (2-tailed)	.000	.000	.000		.000	.000	.000	.000	.000	.769	.016
	N	569	569	569	569	569	569	569	569	569	569	567
Lei/Recre	Pearson Correlation	.475**	.099*	.391**	.153**	1	.373**	.249**	.132**	.300**	-.103*	.132**
	Sig. (2-tailed)	.000	.018	.000	.000		.000	.000	.002	.000	.014	.002
	N	569	569	569	569	569	569	569	569	569	569	567
Companions	Pearson Correlation	.705**	.351**	.414**	.269**	.373**	1	.333**	.348**	.552**	-.200**	.077
	Sig. (2-tailed)	.000	.000	.000	.000	.000		.000	.000	.000	.000	.065
	N	569	569	569	569	569	569	569	569	569	569	567
Alco/Drug	Pearson Correlation	.611**	.183**	.266**	.238**	.249**	.333**	1	.200**	.331**	-.062	.085*
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000		.000	.000	.138	.042
	N	569	569	569	569	569	569	569	569	569	569	567
Proatt/Orient	Pearson Correlation	.524**	.204**	.193**	.220**	.132**	.348**	.200**	1	.604**	-.109**	.183**

	Sig. (2-tailed)	.000	.000	.000	.000	.002	.000	.000		.000	.009	.000
	N	569	569	569	569	569	569	569	569	569	569	567
AntiPatt	Pearson Correlation	.778**	.471**	.457**	.335**	.300**	.552**	.331**	.604**	1	-.175**	.247**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000
	N	569	569	569	569	569	569	569	569	569	569	567
Age in 2010	Pearson Correlation	-.192**	.082	-.312**	.012	-.103*	-.200**	-.062	-.109**	-.175**	1	-.224**
	Sig. (2-tailed)	.000	.052	.000	.769	.014	.000	.138	.009	.000		.000
	N	569	569	569	569	569	569	569	569	569	569	567
roc.reoffend12mth	Pearson Correlation	.231**	.139**	.213**	.101*	.132**	.077	.085*	.183**	.247**	-.224**	1
	Sig. (2-tailed)	.000	.001	.000	.016	.002	.065	.042	.000	.000	.000	
	N	567	567	567	567	567	567	567	567	567	567	567

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

a. Sex = Male

Appendix A

Indigenous Females

		Total	CH	EE	FM	LR	C	ADP	PAO	AP	Age in 2010	roc.reoffend 12mth
Total	Correlation Coefficient	1.000	.618**	.625**	.488**	.406*	.527**	.505**	.679**	.813**	-.243	.159
	Sig. (2-tailed)	.	.000	.000	.007	.029	.003	.005	.000	.000	.204	.410
	N	29	29	29	29	29	29	29	29	29	29	29
Criminal History	Correlation Coefficient	.618**	1.000	.046	.186	.227	.496**	.273	.296	.523**	.136	.094
	Sig. (2-tailed)	.000	.	.812	.335	.236	.006	.152	.119	.004	.481	.628
	N	29	29	29	29	29	29	29	29	29	29	29
Educ/Employ	Correlation Coefficient	.625**	.046	1.000	.179	.216	.092	.037	.363	.413*	-.399*	.299
	Sig. (2-tailed)	.000	.812	.	.352	.260	.634	.849	.053	.026	.032	.116
	N	29	29	29	29	29	29	29	29	29	29	29
Fam/Marital	Correlation Coefficient	.488**	.186	.179	1.000	.307	.049	.306	.197	.391*	-.141	.208
	Sig. (2-tailed)	.007	.335	.352	.	.105	.800	.106	.307	.036	.464	.278
	N	29	29	29	29	29	29	29	29	29	29	29
Lei/Recre	Correlation Coefficient	.406*	.227	.216	.307	1.000	.213	.106	.214	.229	-.056	-.201
	Sig. (2-tailed)	.029	.236	.260	.105	.	.268	.584	.265	.232	.771	.295
	N	29	29	29	29	29	29	29	29	29	29	29
Companions	Correlation Coefficient	.527**	.496**	.092	.049	.213	1.000	.134	.239	.386*	-.061	-.172
	Sig. (2-tailed)	.003	.006	.634	.800	.268	.	.488	.212	.039	.753	.374
	N	29	29	29	29	29	29	29	29	29	29	29
Alco/Drug	Correlation Coefficient	.505**	.273	.037	.306	.106	.134	1.000	.405*	.409*	-.090	-.202
	Sig. (2-tailed)	.005	.152	.849	.106	.584	.488	.	.029	.027	.641	.293
	N	29	29	29	29	29	29	29	29	29	29	29
Proatt/Orient	Correlation Coefficient	.679**	.296	.363	.197	.214	.239	.405*	1.000	.800**	-.141	.040
	Sig. (2-tailed)	.000	.119	.053	.307	.265	.212	.029	.	.000	.464	.835

	N	29	29	29	29	29	29	29	29	29	29	29
AntiPatt	Correlation Coefficient	.813**	.523**	.413*	.391*	.229	.386*	.409*	.800**	1.000	-.232	.091
	Sig. (2-tailed)	.000	.004	.026	.036	.232	.039	.027	.000	.	.226	.638
	N	29	29	29	29	29	29	29	29	29	29	29
Age in 2010	Correlation Coefficient	-.243	.136	-.399*	-.141	-.056	-.061	-.090	-.141	-.232	1.000	-.131
	Sig. (2-tailed)	.204	.481	.032	.464	.771	.753	.641	.464	.226	.	.497
	N	29	29	29	29	29	29	29	29	29	29	29
roc.reoffend12 mth	Correlation Coefficient	.159	.094	.299	.208	-.201	-.172	-.202	.040	.091	-.131	1.000
	Sig. (2-tailed)	.410	.628	.116	.278	.295	.374	.293	.835	.638	.497	.
	N	29	29	29	29	29	29	29	29	29	29	29

Non-Indigenous Females

Correlations[a]

		Total	Criminal History	Educ/ Employ	Fam/ Marital	Lei/ Recre	Companions	Alco/ Drug	Proatt/ Orient	AntiPatt	Age in 2010	roc.reoffend1 2mth
Total	Pearson Correlation	1	.561**	.737**	.565**	.382**	.672**	.550**	.555**	.759**	-.155	.102
	Sig. (2-tailed)		.000	.000	.000	.000	.000	.000	.000	.000	.102	.280
	N	113	113	113	113	113	113	113	113	113	113	113
Criminal History	Pearson Correlation	.561**	1	.226*	.277**	-.038	.369**	.256**	.155	.418**	.070	.053
	Sig. (2-tailed)	.000		.016	.003	.690	.000	.006	.101	.000	.464	.579
	N	113	113	113	113	113	113	113	113	113	113	113
Educ/Employ	Pearson Correlation	.737**	.226*	1	.334**	.419**	.478**	.306**	.343**	.559**	-.287**	.045
	Sig. (2-tailed)	.000	.016		.000	.000	.000	.001	.000	.000	.002	.637
	N	113	113	113	113	113	113	113	113	113	113	113
Fam/Marital	Pearson Correlation	.565**	.277**	.334**	1	.247**	.500**	.178	.339**	.481**	-.016	.118
	Sig. (2-tailed)	.000	.003	.000		.008	.000	.060	.000	.000	.863	.212
	N	113	113	113	113	113	113	113	113	113	113	113
Lei/Recre	Pearson Correlation	.382**	-.038	.419**	.247**	1	.219*	.133	.182	.283**	-.083	.064
	Sig. (2-tailed)	.000	.690	.000	.008		.020	.161	.054	.002	.384	.501
	N	113	113	113	113	113	113	113	113	113	113	113
Companions	Pearson Correlation	.672**	.369**	.478**	.500**	.219*	1	.255**	.399**	.578**	-.131	-.048
	Sig. (2-tailed)	.000	.000	.000	.000	.020		.006	.000	.000	.167	.615
	N	113	113	113	113	113	113	113	113	113	113	113
Alco/Drug	Pearson Correlation	.550**	.256**	.306**	.178	.133	.255**	1	.161	.297**	-.065	.102
	Sig. (2-tailed)	.000	.006	.001	.060	.161	.006		.088	.001	.491	.284
	N	113	113	113	113	113	113	113	113	113	113	113
Proatt/Orient	Pearson Correlation	.555**	.155	.343**	.339**	.182	.399**	.161	1	.623**	-.083	.155
	Sig. (2-tailed)	.000	.101	.000	.000	.054	.000	.088		.000	.381	.100

	N	113	113	113	113	113	113	113	113	113	113	113
AntiPatt	Pearson Correlation	.759**	.418**	.559**	.481**	.283**	.578**	.297**	.623**	1	-.180	.098
	Sig. (2-tailed)	.000	.000	.000	.000	.002	.000	.001	.000		.056	.303
	N	113	113	113	113	113	113	113	113	113	113	113
Age in 2010	Pearson Correlation	-.155	.070	-.287**	-.016	-.083	-.131	-.065	-.083	-.180	1	-.229*
	Sig. (2-tailed)	.102	.464	.002	.863	.384	.167	.491	.381	.056		.014
	N	113	113	113	113	113	113	113	113	113	113	113
roc.reoffend12mth	Pearson Correlation	.102	.053	.045	.118	.064	-.048	.102	.155	.098	-.229*	1
	Sig. (2-tailed)	.280	.579	.637	.212	.501	.615	.284	.100	.303	.014	
	N	113	113	113	113	113	113	113	113	113	113	113

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

a. Sex = Female

Sequential Logistic Regression
Indigenous Males

Dependent Variable Encoding[a]

Original Value	Internal Value
no	0
yes	1

a. Sex = Male

Omnibus Tests of Model Coefficients[a]

		Chi-square	df	Sig.
Step 1	Step	2.779	1	.095
	Block	2.779	1	.095
	Model	6.428	2	.040

a. Sex = Male

Model Summary[a]

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	115.783[b]	.065	.090

a. Sex = Male
b. Estimation terminated at iteration number 4 because parameter estimates changed by less than .001.

Hosmer and Lemeshow Test[a]

Step	Chi-square	df	Sig.
1	18.867	8	.016

a. Sex = Male

Contingency Table for Hosmer and Lemeshow Test[a]

		roc.reoffend12mth = no		roc.reoffend12mth = yes		Total
		Observed	Expected	Observed	Expected	
Step 1	1	8	8.448	2	1.552	10
	2	8	7.990	2	2.010	10
	3	7	7.645	3	2.355	10
	4	5	7.234	5	2.766	10
	5	10	6.791	0	3.209	10
	6	9	6.514	1	3.486	10
	7	4	6.142	6	3.858	10
	8	8	5.711	2	4.289	10

9	5	4.965	5	5.035	10
10	0	2.559	6	3.441	6

a. Sex = Male

Classification Table[a,b]

	Observed		Predicted		
			roc.reoffend12mth		Percentage Correct
			no	yes	
Step 1	roc.reoffend12mth	no	59	5	92.2
		yes	26	6	18.8
	Overall Percentage				67.7

a. Sex = Male

b. The cut value is .500

Variables in the Equation[a]

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
								Lower	Upper
Step 1[b]	Agein2010	-.048	.031	2.447	1	.118	.953	.897	1.012
	Total	.049	.030	2.678	1	.102	1.050	.990	1.114
	Constant	-.527	1.184	.198	1	.656	.590		

a. Sex = Male

b. Variable(s) entered on step 1: Total.

Correlation Matrix[a]

		Constant	Agein2010	Total
Step 1	Constant	1.000	-.777	-.698
	Agein2010	-.777	1.000	.132
	Total	-.698	.132	1.000

a. Sex = Male

Subscales

Case Processing Summary[a]

Unweighted Cases[b]		N	Percent
Selected Cases	Included in Analysis	96	100.0
	Missing Cases	0	.0
	Total	96	100.0
Unselected Cases		0	.0
Total		96	100.0

a. Sex = Male

b. If weight is in effect, see classification table for the total number of cases.

Iteration History[a,b,c,d,e]

Iteration		-2 Log likelihood	Coefficients									
			Constant	Age	CH	EE	FM	LR	C	ADP	PAO	AP
Step 1	1	104.783	-.259	-.051	.237	.128	.062	-.650	-.083	.026	.304	-.197
	2	103.527	-.333	-.068	.318	.168	.091	-.822	-.095	.035	.352	-.250
	3	103.504	-.337	-.071	.330	.174	.095	-.850	-.097	.037	.358	-.258
	4	103.504	-.337	-.071	.331	.175	.095	-.850	-.097	.037	.359	-.259

a. Sex = Male

b. Method: Enter

c. Constant is included in the model.

d. Initial -2 Log Likelihood: 118.562

e. Estimation terminated at iteration number 4 because parameter estimates changed by less than .001.

Omnibus Tests of Model Coefficients[a]

		Chi-square	df	Sig.
Step 1	Step	15.058	8	.058
	Block	15.058	8	.058
	Model	18.706	9	.028

a. Sex = Male

Model Summary[a]

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	103.504[b]	.177	.246

a. Sex = Male

b. Estimation terminated at iteration number 4 because parameter estimates changed by less than .001.

Hosmer and Lemeshow Test[a]

Step	Chi-square	df	Sig.
1	19.648	8	.012

a. Sex = Male

Contingency Table for Hosmer and Lemeshow Test[a]

		roc.reoffend12mth = no		roc.reoffend12mth = yes		Total
		Observed	Expected	Observed	Expected	
Step 1	1	7	9.241	3	.759	10
	2	9	8.910	1	1.090	10

3	10	8.392	0	1.608	10
4	8	7.762	2	2.238	10
5	9	7.099	1	2.901	10
6	7	6.572	3	3.428	10
7	4	5.826	6	4.174	10
8	3	4.906	7	5.094	10
9	7	3.898	3	6.102	10
10	0	1.394	6	4.606	6

a. Sex = Male

Classification Table[a,b]

	Observed		Predicted		
			roc.reoffend12mth		Percentage Correct
			no	yes	
Step 1	roc.reoffend12mth	no	56	8	87.5
		yes	18	14	43.8
	Overall Percentage				72.9

a. Sex = Male

b. The cut value is .500

Variables in the Equation[a]

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
								Lower	Upper
Step 1[b]	Agein2010	-.071	.041	2.970	1	.085	.932	.860	1.010
	CriminalHistory	.331	.164	4.057	1	.044	1.392	1.009	1.920
	EducEmploy	.175	.120	2.101	1	.147	1.191	.940	1.508
	FamMarital	.095	.249	.145	1	.704	1.099	.675	1.790
	LeiRecre	-.850	.421	4.076	1	.043	.427	.187	.975
	Companions	-.097	.205	.222	1	.637	.908	.607	1.358
	AlcoDrug	.037	.127	.084	1	.773	1.037	.809	1.331
	ProattOrient	.359	.223	2.588	1	.108	1.431	.925	2.216
	AntiPatt	-.259	.338	.585	1	.445	.772	.398	1.498
	Constant	-.337	1.466	.053	1	.818	.714		

a. Sex = Male

b. Variable(s) entered on step 1: CriminalHistory, EducEmploy, FamMarital, LeiRecre, Companions, AlcoDrug, ProattOrient, AntiPatt.

	Constant	Age	CH	EE	FM	LR	C	ADP	PAO	AP
Constant	1.000	-.683	-.339	-.384	-.060	-.250	-.039	-.010	.026	.116
Agein2010	-.683	1.000	-.265	.378	-.181	.118	.011	-.227	-.093	.099
CriminalHistory	-.339	-.265	1.000	-.034	.197	.040	-.034	.025	.081	-.355
EducEmploy	-.384	.378	-.034	1.000	-.134	-.357	-.088	-.096	.029	-.200
FamMarital	-.060	-.181	.197	-.134	1.000	-.048	.039	-.208	-.089	-.189
LeiRecre	-.250	.118	.040	-.357	-.048	1.000	-.051	-.116	.023	-.125
Companions	-.039	.011	-.034	-.088	.039	-.051	1.000	-.289	-.047	-.217
AlcoDrug	-.010	-.227	.025	-.096	-.208	-.116	-.289	1.000	-.014	.034
ProattOrient	.026	-.093	.081	.029	-.089	.023	-.047	-.014	1.000	-.492
AntiPatt	.116	.099	-.355	-.200	-.189	-.125	-.217	.034	-.492	1.000

Non-Indigenous Males

Dependent Variable Encoding[a]

Original Value	Internal Value
no	0
yes	1

a. Sex = Male

Classification Table[a,b,c]

	Observed		Predicted		
			roc.reoffend12mth		Percentage Correct
			No	yes	
Step 0	roc.reoffend12mth	no	447	0	100.0
		yes	120	0	.0
	Overall Percentage				78.8

a. Sex = Male

b. Constant is included in the model.

c. The cut value is .500

Variables in the Equation[a]

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 0	Constant	-1.315	.103	163.607	1	.000	.268

a. Sex = Male

Omnibus Tests of Model Coefficients[a]

		Chi-square	df	Sig.
Step 1	Step	33.123	1	.000
	Block	33.123	1	.000
	Model	33.123	1	.000

a. Sex = Male

Model Summary[a]

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	552.160[b]	.057	.088

a. Sex = Male

b. Estimation terminated at iteration number 5 because parameter estimates changed by less than .001.

Classification Table[a,b]

	Observed		Predicted		
			roc.reoffend12mth		Percentage Correct
			No	yes	
Step 1	roc.reoffend12mth	No	447	0	100.0
		Yes	120	0	.0
	Overall Percentage				78.8

a. Sex = Male

b. The cut value is .500

Variables in the Equation[a]

		B	S.E.	Wald	Df	Sig.	Exp(B)	95% C.I.for EXP(B)	
								Lower	Upper
Step 1[b]	Agein2010	-.068	.013	26.490	1	.000	.934	.910	.959
	Constant	.671	.378	3.149	1	.076	1.957		

a. Sex = Male

b. Variable(s) entered on step 1: Agein2010.

Omnibus Tests of Model Coefficients[a]

		Chi-square	df	Sig.
Step 1	Step	21.895	1	.000
	Block	21.895	1	.000
	Model	55.017	2	.000

a. Sex = Male

Model Summary[a]

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	530.265[b]	.092	.144

a. Sex = Male

b. Estimation terminated at iteration number 5 because parameter estimates changed by less than .001.

Classification Table[a,b]

	Observed		Predicted		
			roc.reoffend12mth		Percentage Correct
			No	yes	
Step 1	roc.reoffend12mth	No	439	8	98.2
		yes	115	5	4.2
	Overall Percentage				78.3

a. Sex = Male

b. The cut value is .500

Variables in the Equation[a]

		B	S.E.	Wald	Df	Sig.	Exp(B)	95% C.I.for EXP(B)	
								Lower	Upper
Step 1[b]	Agein2010	-.062	.014	20.529	1	.000	.940	.915	.965
	Total	.066	.015	20.698	1	.000	1.069	1.038	1.100
	Constant	-.901	.523	2.970	1	.085	.406		

a. Sex = Male

b. Variable(s) entered on step 1: Total.

Classification Table[a,b,c]

	Observed		Predicted		
			roc.reoffend12mth		Percentage Correct
			No	yes	
Step 0	roc.reoffend12mth	no	447	0	100.0
		yes	120	0	.0
	Overall Percentage				78.8

a. Sex = Male

b. Constant is included in the model.

c. The cut value is .500

Variables in the Equation[a]

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 0	Constant	-1.315	.103	163.607	1	.000	.268

a. Sex = Male

Omnibus Tests of Model Coefficients[a]

		Chi-square	df	Sig.
Step 1	Step	33.123	1	.000
	Block	33.123	1	.000
	Model	33.123	1	.000

a. Sex = Male

Model Summary[a]

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	552.160[b]	.057	.088

a. Sex = Male

b. Estimation terminated at iteration number 5 because parameter estimates changed by less than .001.

Classification Table[a,b]

	Observed		Predicted		
			roc.reoffend12mth		Percentage Correct
			No	yes	
Step 1	roc.reoffend12mth	no	447	0	100.0
		yes	120	0	.0
	Overall Percentage				78.8

a. Sex = Male

b. The cut value is .500

Variables in the Equation[a]

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
								Lower	Upper
Step 1[b]	Agein2010	-.068	.013	26.490	1	.000	.934	.910	.959
	Constant	.671	.378	3.149	1	.076	1.957		

a. Sex = Male

b. Variable(s) entered on step 1: Agein2010.

Omnibus Tests of Model Coefficients[a]

		Chi-square	df	Sig.
Step 1	Step	44.243	8	.000
	Block	44.243	8	.000
	Model	77.366	9	.000

a. Sex = Male

Model Summary[a]

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	507.916[b]	.128	.198

a. Sex = Male

b. Estimation terminated at iteration number 5 because parameter estimates changed by less than .001.

Classification Table[a,b]

	Observed		Predicted		
			roc.reoffend12mth		Percentage Correct
			No	yes	
Step 1	roc.reoffend12mth	no	429	18	96.0
		yes	105	15	12.5
	Overall Percentage				78.3

a. Sex = Male

b. The cut value is .500

Variables in the Equation[a]

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
								Lower	Upper
Step 1[b]	Agein2010	-.068	.015	20.057	1	.000	.934	.907	.962
	CriminalHistory	.184	.077	5.617	1	.018	1.202	1.032	1.398
	EducEmploy	.063	.051	1.575	1	.210	1.066	.965	1.177
	FamMarital	.085	.105	.647	1	.421	1.089	.885	1.338
	LeiRecre	.339	.180	3.538	1	.060	1.404	.986	2.000
	Companions	-.360	.111	10.594	1	.001	.698	.562	.867
	AlcoDrug	.013	.057	.053	1	.817	1.013	.907	1.132
	ProattOrient	.147	.110	1.792	1	.181	1.158	.934	1.437
	AntiPatt	.327	.155	4.432	1	.035	1.387	1.023	1.880
	Constant	-1.088	.582	3.492	1	.062	.337		

a. Sex = Male

b. Variable(s) entered on step 1: CriminalHistory, EducEmploy, FamMarital, LeiRecre, Companions, AlcoDrug, ProattOrient, AntiPatt.

Indigenous Females

Classification Table[a,b,c]

Observed			Predicted		
			roc.reoffend12mth		Percentage Correct
			no	yes	
Step 0	roc.reoffend12mth	no	24	0	100.0
		yes	5	0	.0
	Overall Percentage				82.8

a. Sex = Female

b. Constant is included in the model.

c. The cut value is .500

Iteration History[a,b,c,d,e]

Iteration		-2 Log likelihood	Coefficients		
			Constant	Agein2010	Total
Step 1	1	26.332	-1.143	-.022	.020
	2	25.809	-1.216	-.039	.032
	3	25.793	-1.164	-.045	.035
	4	25.793	-1.160	-.046	.035
	5	25.793	-1.159	-.046	.035

a. Sex = Female

b. Method: Enter

c. Constant is included in the model.

d. Initial -2 Log Likelihood: 26.040

e. Estimation terminated at iteration number 5 because parameter estimates changed by less than .001.

Omnibus Tests of Model Coefficients[a]

		Chi-square	df	Sig.
Step 1	Step	.247	1	.619
	Block	.247	1	.619
	Model	.869	2	.647

a. Sex = Female

Model Summary[a]

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	25.793[b]	.030	.049

a. Sex = Female

b. Estimation terminated at iteration number 5 because parameter estimates changed by less than .001.

Hosmer and Lemeshow Test[a]

Step	Chi-square	df	Sig.
1	10.393	8	.239

a. Sex = Female

Contingency Table for Hosmer and Lemeshow Test[a]

		roc.reoffend12mth = no		roc.reoffend12mth = yes		Total
		Observed	Expected	Observed	Expected	
Step 1	1	3	2.787	0	.213	3
	2	2	2.730	1	.270	3
	3	3	2.641	0	.359	3
	4	3	2.514	0	.486	3
	5	2	2.466	1	.534	3
	6	3	2.448	0	.552	3
	7	3	2.406	0	.594	3
	8	1	2.356	2	.644	3
	9	3	2.230	0	.770	3
	10	1	1.421	1	.579	2

a. Sex = Female

Classification Table[a,b]

	Observed		Predicted		
			roc.reoffend12mth		Percentage Correct
			no	yes	
Step 1	roc.reoffend12mth	no	24	0	100.0
		yes	5	0	.0
	Overall Percentage				82.8

a. Sex = Female

b. The cut value is .500

Variables in the Equation[a]

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
								Lower	Upper
Step 1[b]	Agein2010	-.046	.076	.364	1	.546	.955	.823	1.108
	Total	.035	.072	.242	1	.623	1.036	.899	1.194
	Constant	-1.159	3.017	.148	1	.701	.314		

a. Sex = Female

b. Variable(s) entered on step 1: Total.

Correlation Matrix[a]

		Constant	Agein2010	Total
Step 1	Constant	1.000	-.798	-.740
	Agein2010	-.798	1.000	.219
	Total	-.740	.219	1.000

a. Sex = Female

Indigenous Females Subscales

Case Processing Summary[a]

Unweighted Cases[b]		N	Percent
Selected Cases	Included in Analysis	29	100.0
	Missing Cases	0	.0
	Total	29	100.0
Unselected Cases		0	.0
Total		29	100.0

a. Sex = Female

b. If weight is in effect, see classification table for the total number of cases.

	-2 Log likelihood	Coefficients									
		Constant	Age	CH	EE	FM	LR	C	ADP	POA	AP
1	18.367	.501	-.023	.305	.173	.396	-1.085	-.275	-.300	.147	-.257
2	14.481	.029	-.019	.574	.350	.760	-2.032	-.479	-.421	.340	-.657
3	12.707	-1.278	.004	.922	.605	1.164	-3.310	-.621	-.488	.549	-1.285
4	11.869	-2.653	.031	1.297	.929	1.584	-4.839	-.742	-.576	.754	-2.033
5	11.493	-3.764	.059	1.678	1.301	2.005	-6.518	-.866	-.714	.921	-2.829
6	11.272	-5.232	.100	2.144	1.813	2.447	-8.616	-1.074	-.899	1.047	-3.759
7	11.006	-8.644	.197	3.142	2.957	3.290	-13.103	-1.611	-1.278	1.219	-5.643
8	10.239	-21.529	.504	7.732	7.646	7.506	-32.164	-3.696	-2.995	2.144	-14.100
9	3.065	-204.317	4.439	78.199	76.265	73.577	-315.820	-34.452	-28.683	16.744	-141.339
10	.997	-346.471	7.532	132.660	129.436	124.548	-535.786	-58.640	-48.576	28.192	-239.460

11	.353	-472.974	10.284	181.113	176.734	169.919	-731.471	-80.142	-66.280	38.393	-326.781
12	.128	-595.045	12.939	227.865	222.371	213.704	-920.289	-100.885	-83.363	48.241	-411.045
13	.047	-715.611	15.561	274.039	267.443	256.951	-1106.773	-121.370	-100.237	57.969	-494.272
14	.017	-835.638	18.172	320.007	312.314	300.005	-1292.423	-141.763	-117.035	67.654	-577.127
15	.006	-955.469	20.778	365.900	357.112	342.989	-1477.769	-162.122	-133.805	77.324	-659.847
16	.002	-1075.227	23.383	411.765	401.882	385.948	-1663.004	-182.469	-150.566	86.987	-742.517
17	.001	-1194.960	25.987	457.620	446.642	428.896	-1848.197	-202.811	-167.323	96.649	-825.169
18	.000	-1314.682	28.591	503.471	491.399	471.842	-2033.376	-223.152	-184.078	106.310	-907.815
19	.000	-1434.401	31.195	549.321	536.155	514.786	-2218.549	-243.492	-200.833	115.970	-990.458
20	.000	-1554.119	33.799	595.170	580.910	557.730	-2403.720	-263.831	-217.588	125.631	-1073.100

Omnibus Tests of Model Coefficients[a]

		Chi-square	df	Sig.
Step 1	Step	26.040	8	.001
	Block	26.040	8	.001
	Model	26.662	9	.002

a. Sex = Female

Model Summary[a]

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	.000[b]	.601	1.000

a. Sex = Female

b. Estimation terminated at iteration number 20 because maximum iterations has been reached. Final solution cannot be found.

Hosmer and Lemeshow Test[a]

Step	Chi-square	df	Sig.
1	.000	3	1.000

a. Sex = Female

Contingency Table for Hosmer and Lemeshow Test[a]

		roc.reoffend12mth = no		roc.reoffend12mth = yes		Total
		Observed	Expected	Observed	Expected	
Step 1	1	16	16.000	0	.000	16
	2	3	3.000	0	.000	3
	3	3	3.000	0	.000	3
	4	2	2.000	1	1.000	3
	5	0	.000	4	4.000	4

a. Sex = Female

Classification Table[a,b]

	Observed		Predicted		
			roc.reoffend12mth		Percentage Correct
			no	yes	
Step 1	roc.reoffend12mth	no	24	0	100.0
		yes	0	5	100.0
	Overall Percentage				100.0

a. Sex = Female

b. The cut value is .500

Variables in the Equation[a]

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
								Lower	Upper
Step 1[b]	Agein2010	33.799	600.757	.003	1	.955	476982344763227.100	.000	.
	CriminalHistory	595.170	10522.197	.003	1	.955	3.014E+258	.000	.
	EducEmploy	580.910	10270.179	.003	1	.955	1.932E+252	.000	.
	FamMarital	557.730	9865.661	.003	1	.955	1.655E+242	.000	.
	LeiRecre	-2403.720	42436.027	.003	1	.955	.000	.000	.
	Companions	-263.831	4632.567	.003	1	.955	.000	.000	.
	AlcoDrug	-217.588	3850.502	.003	1	.955	.000	.000	.
	ProattOrient	125.631	2229.986	.003	1	.955	3.637E+054	.000	.
	AntiPatt	-1073.100	19008.472	.003	1	.955	.000	.000	.
	Constant	-1554.119	27522.075	.003	1	.955	.000		

a. Sex = Female

b. Variable(s) entered on step 1: CriminalHistory, EducEmploy, FamMarital, LeiRecre, Companions, AlcoDrug, ProattOrient, AntiPatt.

	Constant	Age	CH	EE	FM	LR	C	ADP	PAO	AP
Constant	1.000	-.993	-.996	-.998	-.994	.997	.995	.991	-.970	.996
Agein2010	-.993	1.000	.987	.992	.984	-.991	-.990	-.989	.972	-.988
CriminalHistory	-.996	.987	1.000	.999	.999	-.999	-.996	-.996	.980	-.999
EducEmploy	-.998	.992	.999	1.000	.998	-1.000	-.997	-.997	.980	-.999
FamMarital	-.994	.984	.999	.998	1.000	-.999	-.993	-.997	.985	-.999
LeiRecre	.997	-.991	-.999	-1.000	-.999	1.000	.997	.998	-.982	.999
Companions	.995	-.990	-.996	-.997	-.993	.997	1.000	.992	-.970	.994
AlcoDrug	.991	-.989	-.996	-.997	-.997	.998	.992	1.000	-.989	.997
ProattOrient	-.970	.972	.980	.980	.985	-.982	-.970	-.989	1.000	-.984
AntiPatt	.996	-.988	-.999	-.999	-.999	.999	.994	.997	-.984	1.000

Non-Indigenous Females

Classification Table[a,b,c]

	Observed		Predicted		
			roc.reoffend12mth		Percentage Correct
			No	yes	
Step 0	roc.reoffend12mth	no	95	0	100.0
		yes	18	0	.0
	Overall Percentage				84.1

a. Sex = Female

b. Constant is included in the model.

c. The cut value is .500

Variables in the Equation[a]

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 0[b]	Constant	-1.664	.257	41.876	1	.000	.189

a. Sex = Female

b. Variable(s) entered on step 1: Total.

Omnibus Tests of Model Coefficients[a]

		Chi-square	df	Sig.
Step 1	Step	6.691	1	.010
	Block	6.691	1	.010
	Model	6.691	1	.010

a. Sex = Female

Model Summary[a]

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	92.408[b]	.057	.098

a. Sex = Female

b. Estimation terminated at iteration number 5 because parameter estimates changed by less than .001.

Classification Table[a,b]

	Observed		Predicted		
			roc.reoffend12mth		Percentage Correct
			No	yes	
Step 1	roc.reoffend12mth	no	95	0	100.0
		yes	18	0	.0

Overall Percentage				84.1

a. Sex = Female

b. The cut value is .500

Variables in the Equation[a]

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
								Lower	Upper
Step 1[b]	Agein2010	-.079	.034	5.433	1	.020	.924	.865	.988
	Constant	.673	.969	.482	1	.488	1.960		

a. Sex = Female

b. Variable(s) entered on step 1: Agein2010.

Omnibus Tests of Model Coefficients[a]

		Chi-square	df	Sig.
Step 1	Step	.523	1	.470
	Block	.523	1	.470
	Model	7.214	2	.027

a. Sex = Female

Model Summary[a]

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	91.885[b]	.062	.106

a. Sex = Female

b. Estimation terminated at iteration number 5 because parameter estimates changed by less than .001.

Classification Table[a,b]

	Observed		Predicted		
			roc.reoffend12mth		Percentage Correct
			No	yes	
Step 1	roc.reoffend12mth	no	95	0	100.0
		yes	18	0	.0
	Overall Percentage				84.1

a. Sex = Female

b. The cut value is .500

Variables in the Equation[a]

		B	S.E.	Wald	Df	Sig.	Exp(B)	95% C.I.for EXP(B)	
								Lower	Upper
Step 1[b]	Agein2010	-.076	.034	4.989	1	.026	.927	.867	.991
	Total	.025	.035	.527	1	.468	1.026	.958	1.099
	Constant	.112	1.241	.008	1	.928	1.118		

a. Sex = Female

b. Variable(s) entered on step 1: Total.

Classification Table[a,b,c]

	Observed		Predicted		
			roc.reoffend12mth		Percentage Correct
			No	yes	
Step 0	roc.reoffend12mth	no	95	0	100.0
		yes	18	0	.0
	Overall Percentage				84.1

a. Sex = Female

b. Constant is included in the model.

c. The cut value is .500

Variables in the Equation[a]

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 0[b]	Constant	-1.664	.257	41.876	1	.000	.189

a. Sex = Female

b. Variable(s) entered on step 1: CriminalHistory, EducEmploy, FamMarital, LeiRecre, Companions, AlcoDrug, ProattOrient, AntiPatt.

Omnibus Tests of Model Coefficients[a]

		Chi-square	df	Sig.
Step 1	Step	6.691	1	.010
	Block	6.691	1	.010
	Model	6.691	1	.010

a. Sex = Female

Model Summary[a]

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	92.408[b]	.057	.098

a. Sex = Female

b. Estimation terminated at iteration number 5 because parameter estimates changed by less than .001.

Classification Table[a,b]

Observed			Predicted		
			roc.reoffend12mth		Percentage Correct
			No	yes	
Step 1	roc.reoffend12mth	no	95	0	100.0
		yes	18	0	.0
	Overall Percentage				84.1

a. Sex = Female

b. The cut value is .500

Variables in the Equation[a]

		B	S.E.	Wald	Df	Sig.	Exp(B)	95% C.I.for EXP(B)	
								Lower	Upper
Step 1[b]	Agein2010	-.079	.034	5.433	1	.020	.924	.865	.988
	Constant	.673	.969	.482	1	.488	1.960		

a. Sex = Female

b. Variable(s) entered on step 1: Agein2010.

Omnibus Tests of Model Coefficients[a]

		Chi-square	df	Sig.
Step 1	Step	10.230	8	.249
	Block	10.230	8	.249
	Model	16.922	9	.050

a. Sex = Female

Model Summary[a]

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	82.178[b]	.139	.238

a. Sex = Female

b. Estimation terminated at iteration number 6 because parameter estimates changed by less than .001.

Classification Table[a,b]

Observed			Predicted		
			roc.reoffend12mth		Percentage Correct
			No	yes	

Step 1	roc.reoffend12mth	no	93	2	97.9
		yes	15	3	16.7
	Overall Percentage				85.0

a. Sex = Female

b. The cut value is .500

Variables in the Equation[a]

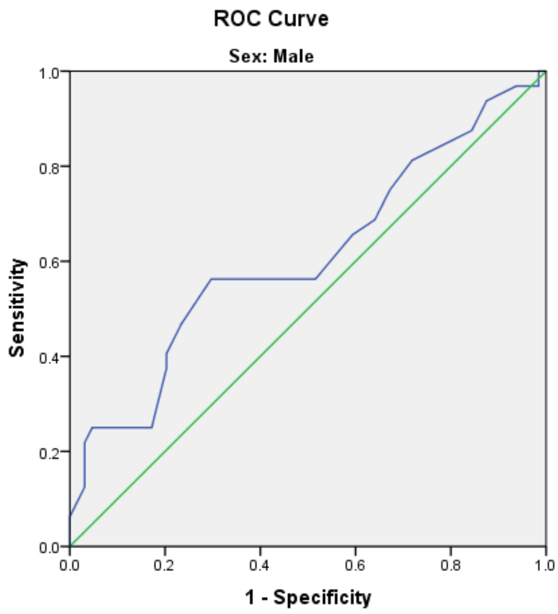
		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
								Lower	Upper
Step 1[b]	Agein2010	-.109	.041	7.086	1	.008	.897	.828	.972
	CriminalHistory	.294	.228	1.663	1	.197	1.342	.858	2.098
	EducEmploy	-.154	.166	.854	1	.356	.857	.619	1.188
	FamMarital	.433	.290	2.236	1	.135	1.542	.874	2.719
	LeiRecre	.214	.470	.209	1	.648	1.239	.494	3.111
	Companions	-.599	.302	3.930	1	.047	.550	.304	.993
	AlcoDrug	.142	.145	.964	1	.326	1.153	.868	1.531
	ProattOrient	.518	.326	2.532	1	.112	1.679	.887	3.178
	AntiPatt	-.241	.534	.204	1	.652	.786	.276	2.237
	Constant	.205	1.397	.021	1	.884	1.227		

a. Sex = Female

b. Variable(s) entered on step 1: CriminalHistory, EducEmploy, FamMarital, LeiRecre, Companions, AlcoDrug, ProattOrient, AntiPatt.

ROC Analysis

Indigenous Males



Diagonal segments are produced by ties.

Area Under the Curve[a]

Test Result Variable(s): Total

Area	Std. Error[b]	Asymptotic Sig.[c]	Asymptotic 95% Confidence Interval	
			Lower Bound	Upper Bound
.609	.064	.082	.483	.735

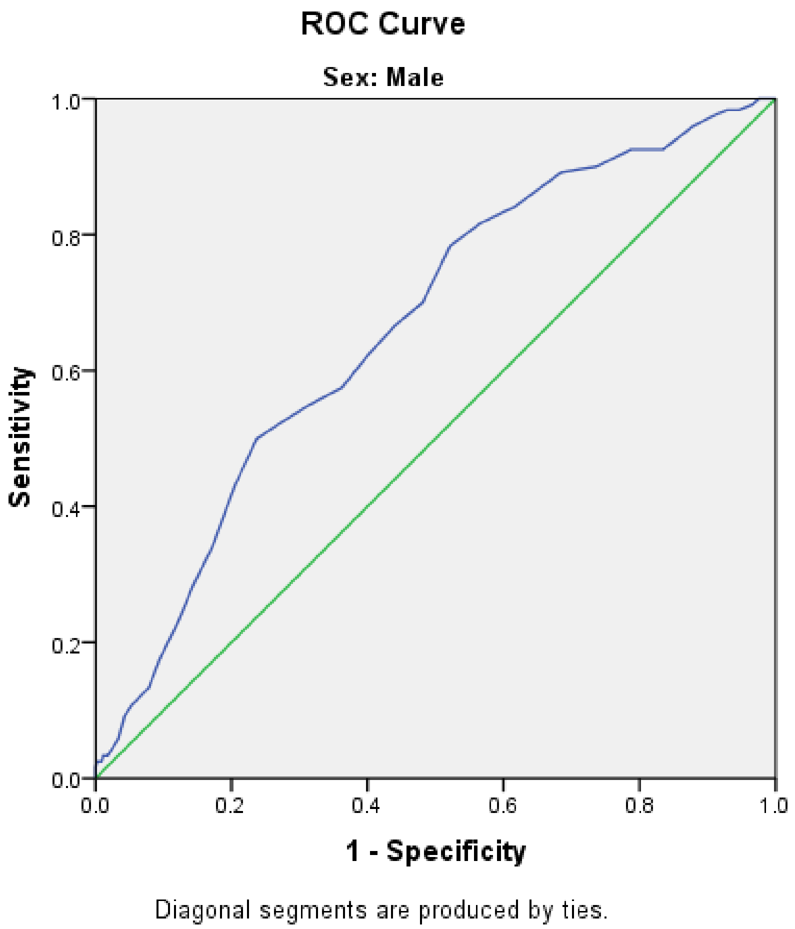
The test result variable(s): Total has at least one tie between the positive actual state group and the negative actual state group. Statistics may be biased.[a]

a. Sex = Male

b. Under the nonparametric assumption

c. Null hypothesis: true area = 0.5

Non-Indigenous Males



Area Under the Curve[a]

Test Result Variable(s): Total

Area	Std. Error[b]	Asymptotic Sig.[c]	Asymptotic 95% Confidence Interval	
			Lower Bound	Upper Bound
.664	.027	.000	.611	.717

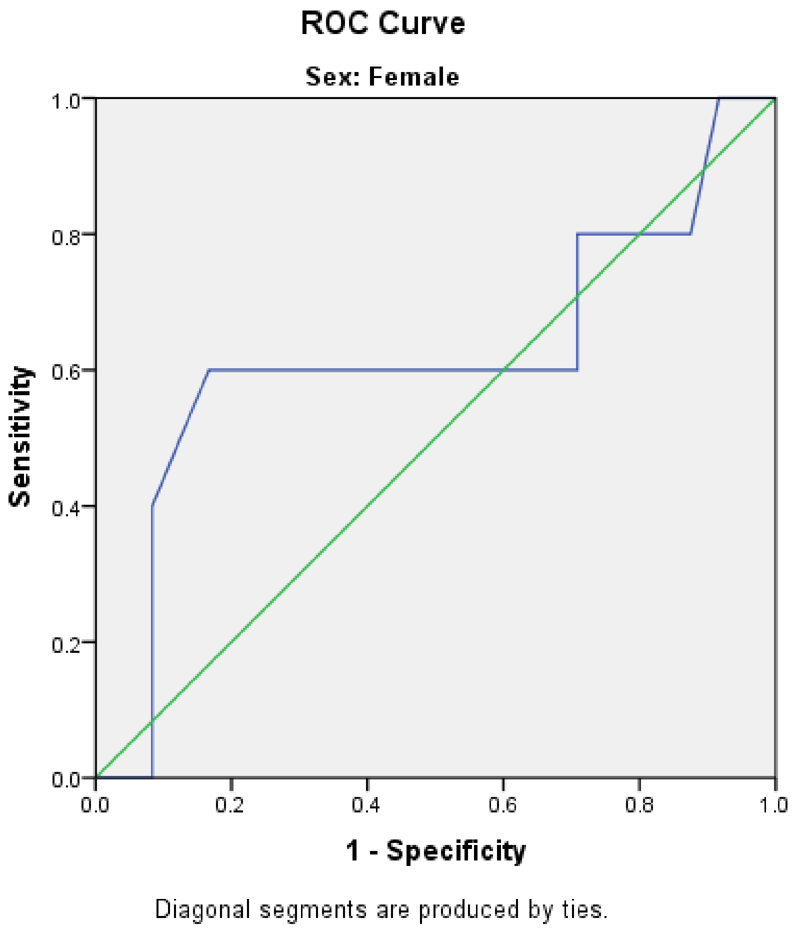
The test result variable(s): Total has at least one tie between the positive actual state group and the negative actual state group. Statistics may be biased.

a. Sex = Male

b. Under the nonparametric assumption

c. Null hypothesis: true area = 0.5

Indigenous Females



Area Under the Curve[a]

Test Result Variable(s): Total

Area	Std. Error[b]	Asymptotic Sig.[c]	Asymptotic 95% Confidence Interval	
			Lower Bound	Upper Bound
.621	.165	.403	.297	.945

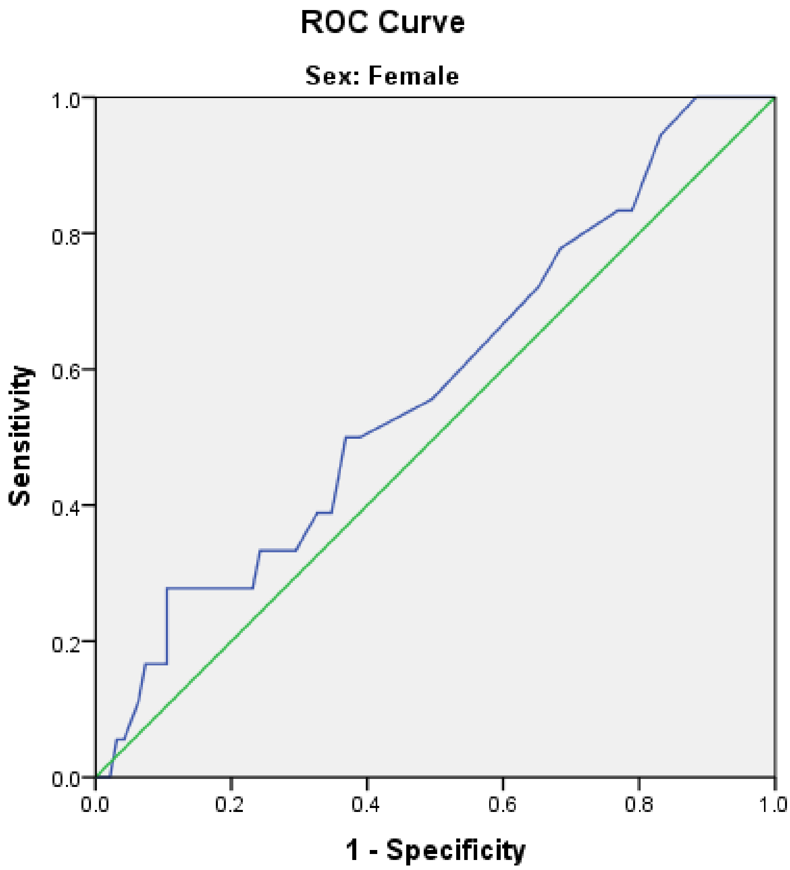
The test result variable(s): Total has at least one tie between the positive actual state group and the negative actual state group. Statistics may be biased.[a]

a. Sex = Female

b. Under the nonparametric assumption

c. Null hypothesis: true area = 0.5

Non-Indigenous Females



Diagonal segments are produced by ties.

Area Under the Curve[a]

Test Result Variable(s): Total

Area	Std. Error[b]	Asymptotic Sig.[c]	Asymptotic 95% Confidence Interval	
			Lower Bound	Upper Bound
.575	.072	.317	.433	.717

The test result variable(s): Total has at least one tie between the positive actual state group and the negative actual state group. Statistics may be biased.

a. Sex = Female

b. Under the nonparametric assumption

c. Null hypothesis: true area = 0.5

Appendix B

SPSS Output for Chapter 3 (Study 2)

Frequencies

Sex

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	254	84.1	84.1	84.1
	Female	48	15.9	15.9	100.0
	Total	302	100.0	100.0	

Sentence Category

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Community	244	80.8	80.8	80.8
	Community + Custodial	54	17.9	17.9	98.7
	Custodial	4	1.3	1.3	100.0
	Total	302	100.0	100.0	

PriorOffences

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no	144	47.7	47.7	47.7
	yes	158	52.3	52.3	100.0
	Total	302	100.0	100.0	

Prior Custodial

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no	184	60.9	60.9	60.9
	yes	118	39.1	39.1	100.0
	Total	302	100.0	100.0	

Prior CommCorr

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no	145	48.0	48.0	48.0
	yes	157	52.0	52.0	100.0
	Total	302	100.0	100.0	

roc.reoffend12mth

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no	237	78.5	78.7	78.7
	yes	64	21.2	21.3	100.0
	Total	301	99.7	100.0	
Missing	System	1	.3		
Total		302	100.0		

Means and Standard Deviations

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Total	302	2	41	19.44	7.948
Criminal History	302	0	8	4.49	1.723
Educ/Employ	302	0	9	4.05	2.729
Fam/Marital	302	0	9	1.60	1.185
Lei/Recre	302	0	2	1.33	.713
Companions	302	0	4	1.81	1.354
Alco/Drug	302	0	8	4.13	2.110
Proatt/Orient	302	0	4	.89	1.219
AntiPatt	302	0	4	1.16	1.126
Valid N (listwise)	302				

Reliability Analyses

Criminal History Subscale

Reliability Statistics

Cronbach's Alpha	N of Items
.652	8

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Q1.1.1	9.96	24.693	.284	.641
Q1.1.2	9.87	23.632	.335	.629
Q1.1.3	9.66	21.516	.422	.604
Q1.1.4	9.02	22.843	.136	.685
Q1.1.5	8.14	20.869	.296	.638
Q1.1.6	8.22	18.429	.500	.573
Q1.1.7	7.46	22.349	.372	.617
Q1.1.8	8.32	17.901	.536	.560

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
10.09	26.789	5.176	8

Intraclass Correlation Coefficient

	Intraclass Correlation[a]	95% Confidence Interval		F Test with True Value 0			
		Lower Bound	Upper Bound	Value	df1	df2	Sig
Single Measures	.190[b]	.152	.233	2.876	301	2107	.000
Average Measures	.652[c]	.590	.709	2.876	301	2107	.000

Two-way mixed effects model where people effects are random and measures effects are fixed.

a.Type C intraclass correlation coefficients using a consistency definition-the between-measure variance is excluded from the denominator variance.

b.The estimator is the same, whether the interaction effect is present or not.

c.This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.

Education/Employment Subscale

Reliability Statistics

Cronbach's Alpha	N of Items
.828	9

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Q1.2.9	12.9172	45.618	.716	.787
Q1.2.10	12.9272	47.104	.631	.798
Q1.2.11	12.3907	52.897	.397	.825
Q1.2.12	12.3212	55.607	.263	.838
Q1.2.13	14.0397	56.470	.245	.839
Q1.2.14	13.1258	53.393	.300	.839
Q1.2.15	13.2848	48.012	.771	.786
Q1.2.16	12.9669	46.398	.770	.782
Q1.2.17	12.9536	46.556	.767	.783

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
14.6159	62.231	7.88864	9

Intraclass Correlation Coefficient

	Intraclass Correlation[a]	95% Confidence Interval		F Test with True Value 0			
		Lower Bound	Upper Bound	Value	df1	df2	Sig
Single Measures	.348[b]	.304	.397	5.808	301	2408	.000
Average Measures	.828[c]	.797	.856	5.808	301	2408	.000

Two-way mixed effects model where people effects are random and measures effects are fixed.

a.Type C intraclass correlation coefficients using a consistency definition-the between-measure variance is excluded from the denominator variance.

b.The estimator is the same, whether the interaction effect is present or not.

c.This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.

Family/Marital Subscale

Reliability Statistics

Cronbach's Alpha	N of Items
.439	4

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Q1.3.18	4.8278	5.631	.159	.444
Q1.3.19	5.0993	4.223	.471	.161
Q1.3.20	5.1060	4.593	.417	.231
Q1.3.21	5.4007	4.221	.084	.634

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
6.8113	6.991	2.64402	4

Intraclass Correlation Coefficient

	Intraclass Correlation[a]	95% Confidence Interval		F Test with True Value 0			
		Lower Bound	Upper Bound	Value	df1	df2	Sig
Single Measures	.164[b]	.109	.224	1.784	301	903	.000
Average Measures	.439[c]	.329	.536	1.784	301	903	.000

Two-way mixed effects model where people effects are random and measures effects are fixed.

a.Type C intraclass correlation coefficients using a consistency definition-the between-measure variance is excluded from the denominator variance.

b.The estimator is the same, whether the interaction effect is present or not.

c.This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.

Leisure/Recreation Subscale

Reliability Statistics

Cronbach's Alpha	N of Items
.418	2

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Q1.4.22	1.45	.820	.276	.[a]
Q1.4.23	.63	1.491	.276	.[a]

a. The value is negative due to a negative average covariance among items. This violates reliability model assumptions. You may want to check item codings.

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
2.08	2.921	1.709	2

Intraclass Correlation Coefficient

	Intraclass Correlation[a]	95% Confidence Interval		F Test with True Value 0			
		Lower Bound	Upper Bound	Value	df1	df2	Sig
Single Measures	.264[b]	.156	.366	1.718	301	301	.000
Average Measures	.418[c]	.270	.536	1.718	301	301	.000

Two-way mixed effects model where people effects are random and measures effects are fixed.

a. Type C intraclass correlation coefficients using a consistency definition-the between-measure variance is excluded from the denominator variance.

b. The estimator is the same, whether the interaction effect is present or not.

c. This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.

Companions Subscale

Reliability Statistics

Cronbach's Alpha	N of Items
.696	4

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Q1.5.24	5.65	6.907	.420	.685
Q1.5.25	4.91	7.809	.541	.604
Q1.5.26	4.40	7.384	.402	.688
Q1.5.27	4.90	7.611	.636	.559

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
6.62	11.991	3.463	4

Intraclass Correlation Coefficient

	Intraclass Correlation[a]	95% Confidence Interval		F Test with True Value 0			
		Lower Bound	Upper Bound	Value	df1	df2	Sig
Single Measures	.364[b]	.304	.427	3.291	301	903	.000
Average Measures	.696[c]	.636	.748	3.291	301	903	.000

Two-way mixed effects model where people effects are random and measures effects are fixed.

a.Type C intraclass correlation coefficients using a consistency definition-the between-measure variance is excluded from the denominator variance.

b.The estimator is the same, whether the interaction effect is present or not.

c.This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.

Alcohol/Drug Problems Subscale

Reliability Statistics

Cronbach's Alpha	N of Items
.753	8

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Q1.6.28	11.91	32.410	.255	.759
Q1.6.29	11.57	30.738	.296	.757
Q1.6.30	10.82	30.807	.478	.725
Q1.6.31	10.67	29.247	.551	.711
Q1.6.32	11.39	26.245	.598	.696
Q1.6.33	10.56	26.540	.564	.703
Q1.6.34	10.17	29.025	.462	.725
Q1.6.35	10.03	30.149	.422	.732

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
12.44	37.085	6.090	8

Intraclass Correlation Coefficient

	Intraclass Correlation[a]	95% Confidence Interval		F Test with True Value 0			
		Lower Bound	Upper Bound	Value	df1	df2	Sig
Single Measures	.276[b]	.233	.324	4.048	301	2107	.000
Average Measures	.753[c]	.709	.793	4.048	301	2107	.000

Two-way mixed effects model where people effects are random and measures effects are fixed.

a.Type C intraclass correlation coefficients using a consistency definition-the between-measure variance is excluded from the denominator variance.

b.The estimator is the same, whether the interaction effect is present or not.

c.This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.

Procriminal Attitude/Orientation subscale

Reliability Statistics

Cronbach's Alpha	N of Items
.747	4

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Q1.7.36	6.84	6.147	.610	.666
Q1.7.37	6.66	6.159	.634	.658
Q1.7.38	6.37	4.805	.511	.732
Q1.7.39	6.12	5.534	.508	.709

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
8.66	9.281	3.046	4

Intraclass Correlation Coefficient

	Intraclass Correlation[a]	95% Confidence Interval		F Test with True Value 0			
		Lower Bound	Upper Bound	Value	df1	df2	Sig
Single Measures	.424[b]	.365	.485	3.948	301	903	.000
Average Measures	.747[c]	.697	.790	3.948	301	903	.000

Two-way mixed effects model where people effects are random and measures effects are fixed.

a.Type C intraclass correlation coefficients using a consistency definition-the between-measure variance is excluded from the denominator variance.

b.The estimator is the same, whether the interaction effect is present or not.

c.This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.

Antisocial Pattern Subscale

Reliability Statistics

Cronbach's Alpha	N of Items
.587	4

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Q1.8.40	5.75	10.194	.265	.589
Q1.8.41	6.40	7.675	.353	.528
Q1.8.42	6.70	6.930	.407	.484
Q1.8.43	6.70	6.512	.475	.419

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
8.51	12.231	3.497	4

Intraclass Correlation Coefficient

	Intraclass Correlation[a]	95% Confidence Interval		F Test with True Value 0			
		Lower Bound	Upper Bound	Value	df1	df2	Sig
Single Measures	.262[b]	.203	.325	2.419	301	903	.000
Average Measures	.587[c]	.505	.658	2.419	301	903	.000

Two-way mixed effects model where people effects are random and measures effects are fixed.

a.Type C intraclass correlation coefficients using a consistency definition-the between-measure variance is excluded from the denominator variance.

b.The estimator is the same, whether the interaction effect is present or not.

c.This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.

LS/CMI Total Score

Reliability Statistics

Cronbach's Alpha	N of Items
.897	43

Item Statistics

	Mean	Std. Deviation	N
Q1.1.1	.1291	.60990	302
Q1.1.2	.2185	.78095	302
Q1.1.3	.4371	1.06016	302
Q1.1.4	1.0728	1.44028	302
Q1.1.5	1.9570	1.43107	302
Q1.1.6	1.8775	1.45413	302
Q1.1.7	2.6325	.98528	302
Q1.1.8	1.7682	1.47828	302
Q1.2.9	1.6987	1.48925	302
Q1.2.10	1.6887	1.49055	302
Q1.2.11	2.2252	1.31524	302
Q1.2.12	2.2947	1.27429	302
Q1.2.13	.5762	1.18370	302
Q1.2.14	1.4901	1.50246	302
Q1.2.15	1.3311	1.19646	302
Q1.2.16	1.6490	1.33791	302
Q1.2.17	1.6623	1.32889	302
Q1.3.18	1.9834	.84891	302
Q1.3.19	1.7119	.95746	302
Q1.3.20	1.7053	.89437	302
Q1.3.21	1.4106	1.49982	302
Q1.4.22	.6258	1.22097	302
Q1.4.23	1.4503	.90542	302
Q1.5.24	.9735	1.40690	302
Q1.5.25	1.7086	1.03165	302
Q1.5.26	2.2185	1.31636	302
Q1.5.27	1.7185	.97660	302
Q1.6.28	.5364	1.15148	302
Q1.6.29	.8742	1.36547	302
Q1.6.30	1.6258	.99620	302
Q1.6.31	1.7781	1.10891	302
Q1.6.32	1.0530	1.43422	302
Q1.6.33	1.8874	1.45151	302
Q1.6.34	2.2748	1.28651	302
Q1.6.35	2.4139	1.19142	302
Q1.7.36	1.8212	.81584	302
Q1.7.37	2.0033	.79240	302
Q1.7.38	2.2947	1.27429	302
Q1.7.39	2.5430	1.07978	302
Q1.8.40	2.7616	.81276	302

Q1.8.41	2.1159	1.37000	302
Q1.8.42	1.8179	1.46836	302
Q1.8.43	1.8179	1.46836	302

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Q1.1.1	69.7053	514.787	.127	.897
Q1.1.2	69.6159	512.065	.169	.897
Q1.1.3	69.3974	505.350	.256	.896
Q1.1.4	68.7616	508.382	.126	.899
Q1.1.5	67.8775	496.281	.319	.896
Q1.1.6	67.9570	492.407	.374	.895
Q1.1.7	67.2020	499.145	.421	.895
Q1.1.8	68.0662	485.697	.472	.893
Q1.2.9	68.1358	481.985	.527	.893
Q1.2.10	68.1457	481.454	.535	.892
Q1.2.11	67.6093	491.089	.443	.894
Q1.2.12	67.5397	496.940	.354	.895
Q1.2.13	69.2583	505.900	.213	.897
Q1.2.14	68.3444	491.682	.371	.895
Q1.2.15	68.5033	484.324	.625	.892
Q1.2.16	68.1854	486.444	.516	.893
Q1.2.17	68.1722	486.774	.514	.893
Q1.3.18	67.8510	510.832	.185	.897
Q1.3.19	68.1225	500.945	.392	.895
Q1.3.20	68.1291	503.415	.360	.895
Q1.3.21	68.4238	503.222	.196	.898
Q1.4.22	69.2086	509.003	.148	.898
Q1.4.23	68.3841	493.420	.607	.893
Q1.5.24	68.8609	489.064	.444	.894
Q1.5.25	68.1258	492.117	.557	.893
Q1.5.26	67.6159	487.028	.515	.893
Q1.5.27	68.1159	492.322	.586	.893
Q1.6.28	69.2980	511.499	.112	.898
Q1.6.29	68.9603	490.118	.441	.894
Q1.6.30	68.2086	507.847	.219	.897
Q1.6.31	68.0563	487.761	.606	.892
Q1.6.32	68.7815	495.613	.329	.896
Q1.6.33	67.9470	490.323	.408	.895

Q1.6.34	67.5596	495.403	.377	.895
Q1.6.35	67.4205	496.178	.397	.895
Q1.7.36	68.0132	496.325	.596	.893
Q1.7.37	67.8311	497.044	.594	.893
Q1.7.38	67.5397	502.661	.252	.897
Q1.7.39	67.2914	501.204	.337	.895
Q1.8.40	67.0728	508.201	.267	.896
Q1.8.41	67.7185	488.940	.460	.894
Q1.8.42	68.0166	483.199	.516	.893
Q1.8.43	68.0166	475.066	.647	.890

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
69.8344	518.664	22.77419	43

Intraclass Correlation Coefficient

	Intraclass Correlation[b]	95% Confidence Interval		F Test with True Value 0			
		Lower Bound	Upper Bound	Value	df1	df2	Sig
Single Measures	.168[a]	.145	.196	9.707	301	12642	.000
Average Measures	.897[c]	.880	.913	9.707	301	12642	.000

Two-way mixed effects model where people effects are random and measures effects are fixed.

a. The estimator is the same, whether the interaction effect is present or not.

b. Type C intraclass correlation coefficients using a consistency definition-the between-measure variance is excluded from the denominator variance.

c. This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.

Correlations

Correlations

		Criminal History	Educ/ Employ	Fam/ Marital	Lei/ Recre	Com-panions	Alco/ Drug	Proatt/ Orient	AntiPatt	Total	Age in 2010	Prior Offences	Rocreoff-end 12mth
Criminal History	Pearson Correlation	1	.265**	.206**	.075	.359**	.200**	.241**	.451**	.568**	.089	.501**	.026
	Sig. (2-tailed)		.000	.000	.192	.000	.000	.000	.000	.000	.123	.000	.652
	N	302	302	302	302	302	302	302	302	302	302	302	301
Educ/Employ	Pearson Correlation	.265**	1	.300**	.405**	.459**	.307**	.278**	.483**	.750**	-.260**	.179**	.182**
	Sig. (2-tailed)	.000		.000	.000	.000	.000	.000	.000	.000	.000	.002	.002
	N	302	302	302	302	302	302	302	302	302	302	302	301
Fam/Marital	Pearson Correlation	.206**	.300**	1	.125*	.307**	.268**	.261**	.366**	.514**	.017	.145*	.046
	Sig. (2-tailed)	.000	.000		.030	.000	.000	.000	.000	.000	.773	.012	.425
	N	302	302	302	302	302	302	302	302	302	302	302	301
Lei/Recre	Pearson Correlation	.075	.405**	.125*	1	.432**	.256**	.161**	.295**	.464**	-.049	.122*	.120*
	Sig. (2-tailed)	.192	.000	.030		.000	.000	.005	.000	.000	.393	.033	.038
	N	302	302	302	302	302	302	302	302	302	302	302	301
Companions	Pearson Correlation	.359**	.459**	.307**	.432**	1	.407**	.386**	.549**	.731**	-.150**	.168**	.057
	Sig. (2-tailed)	.000	.000	.000	.000		.000	.000	.000	.000	.009	.003	.324
	N	302	302	302	302	302	302	302	302	302	302	302	301
Alco/Drug	Pearson Correlation	.200**	.307**	.268**	.256**	.407**	1	.286**	.418**	.641**	-.146*	.093	.121*

	Sig. (2-tailed)	.000	.000	.000	.000	.000		.000	.000	.000	.011	.106	.035
	N	302	302	302	302	302	302	302	302	302	302	302	301
Proatt/Orient	Pearson Correlation	.241**	.278**	.261**	.161**	.386**	.286**	1	.615**	.587**	-.136*	.099	.152**
	Sig. (2-tailed)	.000	.000	.000	.005	.000	.000		.000	.000	.018	.084	.008
	N	302	302	302	302	302	302	302	302	302	302	302	301
AntiPatt	Pearson Correlation	.451**	.483**	.366**	.295**	.549**	.418**	.615**	1	.789**	-.150**	.156**	.166**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000		.000	.009	.007	.004
	N	302	302	302	302	302	302	302	302	302	302	302	301
Total	Pearson Correlation	.568**	.750**	.514**	.464**	.731**	.641**	.587**	.789**	1	-.172**	.298**	.171**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000		.003	.000	.003
	N	302	302	302	302	302	302	302	302	302	302	302	301
Age in 2010	Pearson Correlation	.089	-.260**	.017	-.049	-.150**	-.146*	-.136*	-.150**	-.172**	1	.241**	-.287**
	Sig. (2-tailed)	.123	.000	.773	.393	.009	.011	.018	.009	.003		.000	.000
	N	302	302	302	302	302	302	302	302	302	302	302	301
PriorOffences	Pearson Correlation	.501**	.179**	.145*	.122*	.168**	.093	.099	.156**	.298**	.241**	1	-.006
	Sig. (2-tailed)	.000	.002	.012	.033	.003	.106	.084	.007	.000	.000		.915
	N	302	302	302	302	302	302	302	302	302	302	302	301
roc.reoffend12mth	Pearson Correlation	.026	.182**	.046	.120*	.057	.121*	.152**	.166**	.171**	-.287**	-.006	1
	Sig. (2-tailed)	.652	.002	.425	.038	.324	.035	.008	.004	.003	.000	.915	
	N	301	301	301	301	301	301	301	301	301	301	301	301

**. Correlation is significant at the 0.01 level (2-tailed). *. Correlation is significant at the 0.05 level (2-tailed).

Principal Axis Factor Analysis

Subscales

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.819
Bartlett's Test of Sphericity	Approx. Chi-Square	650.044
	df	28
	Sig.	.000

Correlation Matrix

		Criminal History	Educ/ Employ	Fam/ Marital	Lei/ Recre	Compan -ions	Alco/ Drug	Proatt/ Orient	AntiPatt
Sig. (1-tailed)	Criminal History		.000	.000	.096	.000	.000	.000	.000
	Educ/Employ	.000		.000	.000	.000	.000	.000	.000
	Fam/Marital	.000	.000		.015	.000	.000	.000	.000
	Lei/Recre	.096	.000	.015		.000	.000	.003	.000
	Companions	.000	.000	.000	.000		.000	.000	.000
	Alco/Drug	.000	.000	.000	.000	.000		.000	.000
	Proatt/Orient	.000	.000	.000	.003	.000	.000		.000
	AntiPatt	.000	.000	.000	.000	.000	.000	.000	

Communalities

	Initial
Criminal History	.240
Educ/Employ	.346
Fam/Marital	.176
Lei/Recre	.263
Companions	.448
Alco/Drug	.237
Proatt/Orient	.389
AntiPatt	.596

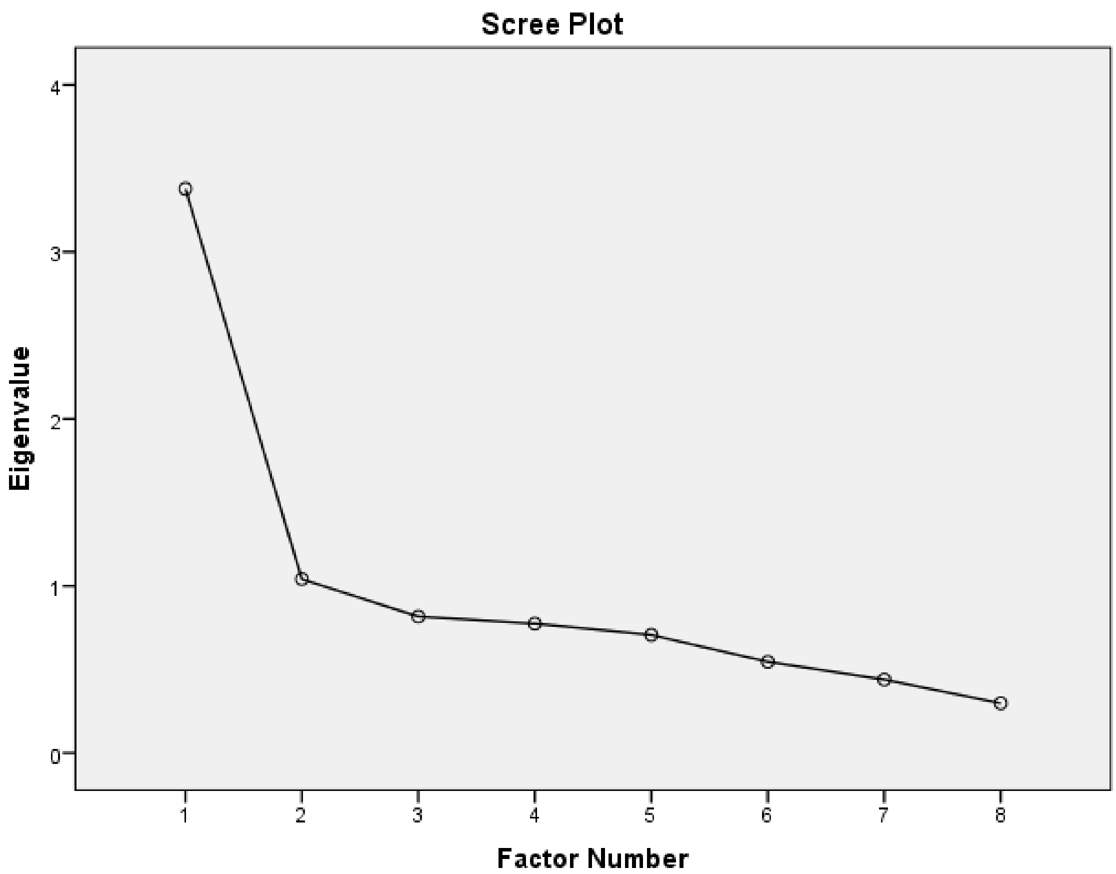
Extraction Method: Principal Axis Factoring.

Total Variance Explained

Factor	Initial Eigenvalues			Rotation Sums of Squared Loadings[a]
	Total	% of Variance	Cumulative %	Total
1	3.377	42.213	42.213	2.681
2	1.041	13.013	55.226	1.759
3	.817	10.211	65.437	
4	.774	9.679	75.117	
5	.707	8.838	83.955	
6	.546	6.824	90.779	
7	.440	5.496	96.275	
8	.298	3.725	100.000	

Extraction Method: Principal Axis Factoring.

a. When factors are correlated, sums of squared loadings cannot be added to obtain a total variance.



Pattern Matrix[a]

	Factor	
	1	2
Criminal History	.504	
Educ/Employ	.330	.413
Fam/Marital	.410	
Lei/Recre		.746
Companions	.454	.405
Alco/Drug	.376	.213
Proatt/Orient	.661	
AntiPatt	.925	

Extraction Method: Principal Axis Factoring.
Rotation Method: Oblimin with Kaiser Normalization.[a]

a. Rotation converged in 6 iterations.

Structure Matrix

	Factor	
	1	2
Criminal History	.480	.202
Educ/Employ	.535	.577
Fam/Marital	.439	.263
Lei/Recre	.307	.714
Companions	.656	.631
Alco/Drug	.481	.400
Proatt/Orient	.622	.250
AntiPatt	.911	.432

Extraction Method: Principal Axis Factoring.
Rotation Method: Oblimin with Kaiser Normalization.

Factor Correlation Matrix

Factor	1	2
1	1.000	.498
2	.498	1.000

Extraction Method: Principal Axis Factoring.
Rotation Method: Oblimin with Kaiser Normalization.

Item Level

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.846
Bartlett's Test of Sphericity	Approx. Chi-Square	6150.161
	df	903
	Sig.	.000

Communalities

	Initial
Q1.1.1	.280
Q1.1.2	.505
Q1.1.3	.471
Q1.1.4	.166
Q1.1.5	.598
Q1.1.6	.453
Q1.1.7	.383
Q1.1.8	.478
Q1.2.9	.756
Q1.2.10	.537
Q1.2.11	.404
Q1.2.12	.319
Q1.2.13	.247
Q1.2.14	.348
Q1.2.15	.815
Q1.2.16	.971
Q1.2.17	.972
Q1.3.18	.317
Q1.3.19	.481
Q1.3.20	.425
Q1.3.21	.224
Q1.4.22	.259
Q1.4.23	.595
Q1.5.24	.470
Q1.5.25	.525
Q1.5.26	.542
Q1.5.27	.607
Q1.6.28	.375
Q1.6.29	.402
Q1.6.30	.521
Q1.6.31	.585
Q1.6.32	.508
Q1.6.33	.458

Q1.6.34	.357
Q1.6.35	.386
Q1.7.36	.682
Q1.7.37	.654
Q1.7.38	.360
Q1.7.39	.432
Q1.8.40	.257
Q1.8.41	.655
Q1.8.42	.582
Q1.8.43	.604

Extraction Method: Principal Axis Factoring.

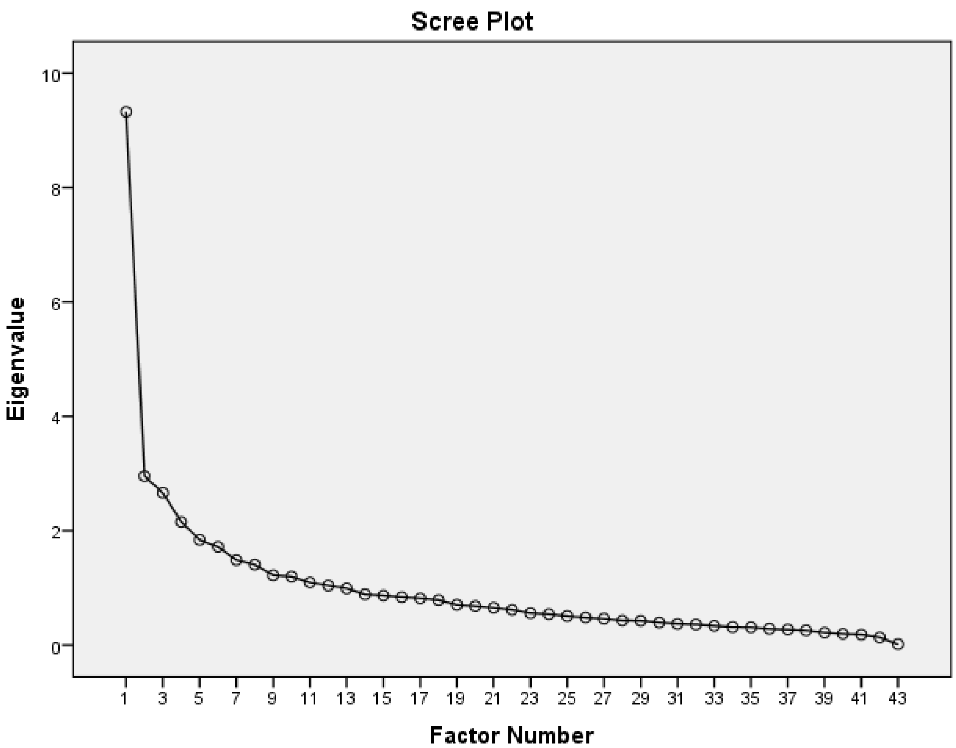
Total Variance Explained

Factor	Initial Eigenvalues			Rotation Sums of Squared Loadings[a]
	Total	% of Variance	Cumulative %	Total
1	9.325	21.685	21.685	3.985
2	2.955	6.871	28.557	5.786
3	2.661	6.188	34.745	1.591
4	2.155	5.011	39.756	4.696
5	1.840	4.280	44.036	2.070
6	1.721	4.002	48.038	3.120
7	1.488	3.461	51.499	3.500
8	1.406	3.269	54.767	2.186
9	1.222	2.841	57.608	2.403
10	1.198	2.786	60.395	2.911
11	1.094	2.545	62.940	1.043
12	1.043	2.425	65.365	2.150
13	.992	2.306	67.671	
14	.887	2.063	69.733	
15	.867	2.015	71.748	
16	.839	1.951	73.699	
17	.817	1.901	75.600	
18	.788	1.832	77.432	
19	.704	1.637	79.069	
20	.681	1.585	80.653	
21	.653	1.519	82.173	
22	.617	1.435	83.607	
23	.558	1.297	84.905	
24	.540	1.255	86.160	
25	.508	1.181	87.341	

26	.481	1.118	88.459	
27	.461	1.073	89.532	
28	.429	.998	90.530	
29	.425	.988	91.518	
30	.395	.919	92.437	
31	.372	.865	93.302	
32	.360	.838	94.140	
33	.336	.782	94.921	
34	.314	.731	95.652	
35	.311	.723	96.375	
36	.284	.660	97.035	
37	.272	.632	97.667	
38	.257	.597	98.265	
39	.218	.507	98.772	
40	.196	.455	99.227	
41	.183	.426	99.653	
42	.135	.314	99.966	
43	.014	.034	100.000	

Extraction Method: Principal Axis Factoring.

a. When factors are correlated, sums of squared loadings cannot be added to obtain a total variance.



Pattern Matrix[a]

	Factor											
	1	2	3	4	5	6	7	8	9	10	11	12
Q1.1.1					.493							
Q1.1.2					.908							
Q1.1.3					.679							
Q1.1.4									.229			
Q1.1.5							.736					
Q1.1.6								-.726				
Q1.1.7								-.412				
Q1.1.8								-.491				
Q1.2.9		-.849										
Q1.2.10		-.516										
Q1.2.11	.214						.271					
Q1.2.12												.442
Q1.2.13												.518
Q1.2.14							.301				.231	
Q1.2.15		-.861										
Q1.2.16		-.980										
Q1.2.17		-.987										
Q1.3.18						-.224					-.496	
Q1.3.19						-.868						
Q1.3.20						-.600						
Q1.3.21											.242	
Q1.4.22									.203	.312		
Q1.4.23		-.353								.282		

Q1.5.24									.625			
Q1.5.25				-.229					.517			
Q1.5.26									-.221	.653		
Q1.5.27										.649		
Q1.6.28			-.595									
Q1.6.29	.221								.319		.286	
Q1.6.30			-.798									
Q1.6.31	.471								.335			
Q1.6.32	.440		-.467									
Q1.6.33	.648											
Q1.6.34	.469											
Q1.6.35	.561											
Q1.7.36				-.730								
Q1.7.37				-.678							-.217	
Q1.7.38				-.592								-.253
Q1.7.39				-.629								
Q1.8.40												
Q1.8.41							.963					
Q1.8.42				-.727								
Q1.8.43	.337					-.319	.220					.213

Extraction Method: Principal Axis Factoring.

Rotation Method: Oblimin with Kaiser Normalization.[a]

a. Rotation converged in 21 iterations.

Structure Matrix

	Factor											
	1	2	3	4	5	6	7	8	9	10	11	12
Q1.1.1					.513							
Q1.1.2					.871							
Q1.1.3					.698			-.268				
Q1.1.4									.242			
Q1.1.5							.743			.211		.244
Q1.1.6					.256		.293	-.771				.259
Q1.1.7	.273	-.234		-.274			.341	-.506				
Q1.1.8		-.232		-.345	.275	-.239	.361	-.590	.239			.227
Q1.2.9	.290	-.852		-.205		-.225				.217		
Q1.2.10	.362	-.633		-.248		-.230	.293			.227		.278
Q1.2.11	.313	-.326		-.273			.414		.240		.235	.316
Q1.2.12	.235						.320					.502
Q1.2.13												.533
Q1.2.14		-.228					.432		.209		.305	.343
Q1.2.15	.283	-.901		-.309		-.314			.204	.302		.237
Q1.2.16	.211	-.941										
Q1.2.17	.210	-.945										
Q1.3.18	.300					-.315					-.520	
Q1.3.19	.208	-.226		-.253		-.856						
Q1.3.20				-.291		-.654				.235	-.200	
Q1.3.21				-.228					.212		.285	
Q1.4.22									.255	.350		
Q1.4.23	.390	-.536		-.363		-.300	.213		.345	.514		.345

Q1.5.24	.213	-.323		-.279			.212		.682	.231		
Q1.5.25	.280	-.347		-.420			.295		.628	.315		.301
Q1.5.26	.374	-.350		-.295		-.274	.296	-.219		.710		.209
Q1.5.27	.260	-.374		-.371		-.387	.264	-.262	.277	.745		.265
Q1.6.28			-.583									
Q1.6.29	.304	-.257		-.207			.308	-.237	.436		.302	
Q1.6.30	.317		-.826								-.216	
Q1.6.31	.592	-.326		-.334			.306		.478	.380		.249
Q1.6.32	.557		-.567	-.209								
Q1.6.33	.702	-.209	-.278	-.226		-.203						
Q1.6.34	.540	-.269	-.210									
Q1.6.35	.605			-.235		-.286				.273		
Q1.7.36	.288	-.290		-.796		-.333	.240		.278	.253		.210
Q1.7.37	.270	-.266		-.770		-.407	.250	-.214	.326	.281		.255
Q1.7.38				-.584		-.214						
Q1.7.39				-.615								
Q1.8.40	.230			-.277		-.261				.225	-.212	
Q1.8.41				-.224			.935	-.395				
Q1.8.42	.289	-.246		-.762		-.250	.243			.267		
Q1.8.43	.523	-.434		-.411		-.493	.438			.327		.421

Extraction Method: Principal Axis Factoring.

Rotation Method: Oblimin with Kaiser Normalization.

Factor Correlation Matrix

Factor	1	2	3	4	5	6	7	8	9	10	11	12
1	1.00	-.301	-.196	-.276	.064	-.219	.181	-.150	.118	.230	-.121	.165
2	-.301	1.00	-.020	.253	-.021	.223	-.204	.142	-.152	-.226	-.051	-.224
3	-.196	-.020	1.00	.040	-.064	-.040	.030	-.030	-.014	-.013	.061	.006
4	-.276	.253	.040	1.00	-.100	.335	-.231	.174	-.221	-.233	-.026	-.098
5	.064	-.021	-.064	-.100	1.000	-.136	.146	-.230	.099	-.025	.092	.166
6	-.219	.223	-.040	.335	-.136	1.000	-.156	.157	-.155	-.186	.100	-.130
7	.181	-.204	.030	-.231	.146	-.156	1.000	-.230	.196	.215	.159	.282
8	-.150	.142	-.030	.174	-.230	.157	-.230	1.000	-.102	-.059	.031	-.078
9	.118	-.152	-.014	-.221	.099	-.155	.196	-.102	1.000	.204	.130	.157
10	.230	-.226	-.013	-.233	-.025	-.186	.215	-.059	.204	1.000	-.079	.219
11	-.121	-.051	.061	-.026	.092	.100	.159	.031	.130	-.079	1.000	.099
12	.165	-.224	.006	-.098	.166	-.130	.282	-.078	.157	.219	.099	1.000

Extraction Method: Principal Axis Factoring.

Rotation Method: Oblimin with Kaiser Normalization.

Factor Analysis with LS/CMI Items Removed

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.871
Bartlett's Test of Sphericity	Approx. Chi-Square	5177.786
	df	496
	Sig.	.000

Communalities

	Initial
Q1.1.5	.575
Q1.1.6	.417
Q1.1.7	.347
Q1.1.8	.446
Q1.2.9	.743
Q1.2.10	.516
Q1.2.11	.349
Q1.2.12	.245
Q1.2.14	.276
Q1.2.15	.809
Q1.2.16	.970
Q1.2.17	.971
Q1.3.19	.452
Q1.3.20	.409

Q1.4.23	.539
Q1.5.24	.444
Q1.5.25	.510
Q1.5.26	.528
Q1.5.27	.590
Q1.6.29	.351
Q1.6.31	.570
Q1.6.32	.378
Q1.6.33	.423
Q1.6.34	.327
Q1.6.35	.353
Q1.7.36	.668
Q1.7.37	.631
Q1.7.38	.325
Q1.7.39	.397
Q1.8.41	.628
Q1.8.42	.572
Q1.8.43	.591

Extraction Method: Principal Axis Factoring.

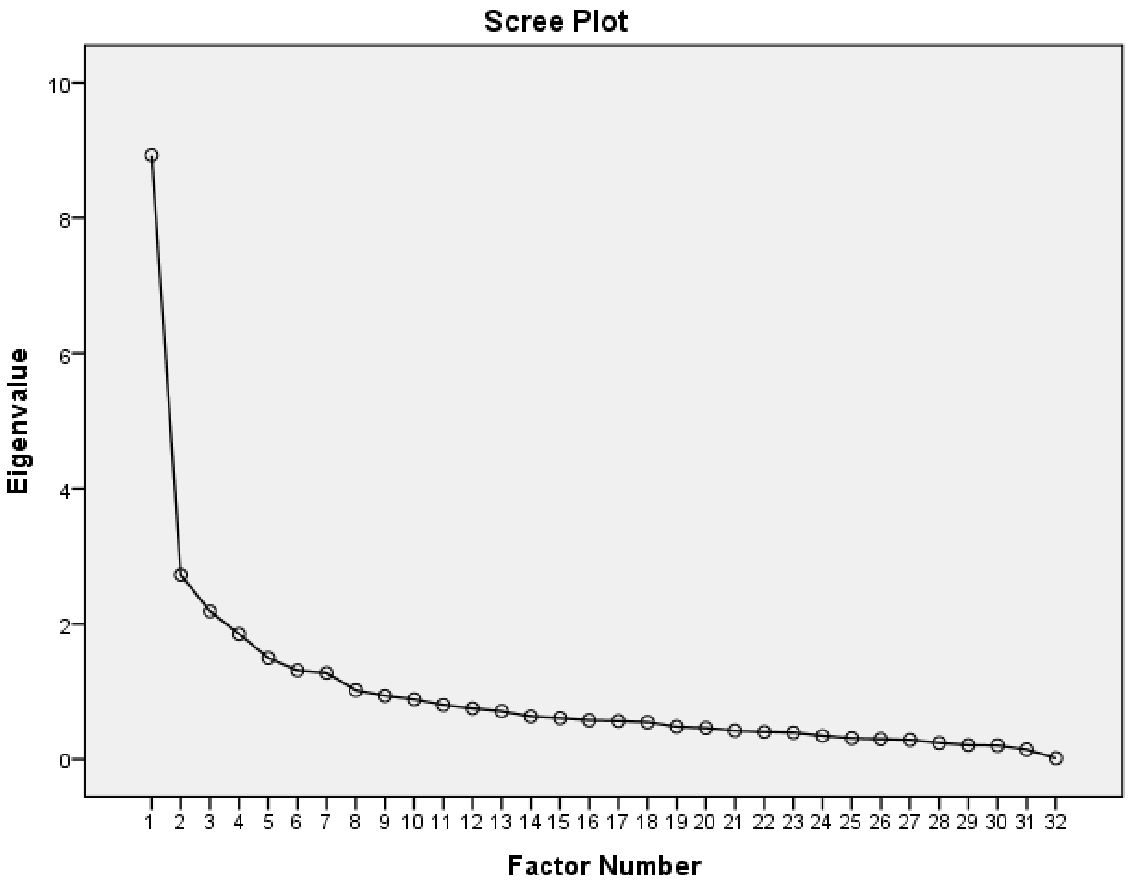
Total Variance Explained

Factor	Initial Eigenvalues			Rotation Sums of Squared Loadings[a]
	Total	% of Variance	Cumulative %	Total
1	8.927	27.898	27.898	4.401
2	2.726	8.517	36.415	5.591
3	2.186	6.833	43.248	3.639
4	1.851	5.783	49.031	3.469
5	1.497	4.679	53.710	3.004
6	1.312	4.101	57.811	3.872
7	1.274	3.982	61.793	2.304
8	1.019	3.184	64.977	4.477
9	.939	2.934	67.911	
10	.884	2.764	70.675	
11	.803	2.508	73.183	
12	.751	2.345	75.528	
13	.709	2.215	77.744	
14	.631	1.971	79.715	
15	.607	1.898	81.613	
16	.574	1.795	83.408	
17	.565	1.766	85.173	

18	.547	1.708	86.881	
19	.480	1.499	88.380	
20	.461	1.440	89.820	
21	.422	1.317	91.137	
22	.404	1.261	92.398	
23	.393	1.229	93.627	
24	.344	1.076	94.703	
25	.308	.964	95.667	
26	.297	.927	96.594	
27	.284	.888	97.482	
28	.240	.750	98.232	
29	.207	.648	98.880	
30	.202	.633	99.512	
31	.141	.441	99.953	
32	.015	.047	100.000	

Extraction Method: Principal Axis Factoring.

a. When factors are correlated, sums of squared loadings cannot be added to obtain a total variance.



Pattern Matrix[a]

	Factor							
	1	2	3	4	5	6	7	8
Q1.1.5			.715					
Q1.1.6							.729	
Q1.1.7							.454	
Q1.1.8							.527	
Q1.2.9		-.834						
Q1.2.10		-.507						
Q1.2.11			.400					
Q1.2.12			.322					
Q1.2.14			.458					
Q1.2.15		-.821						
Q1.2.16		-.983						
Q1.2.17		-.998						
Q1.3.19					.837			
Q1.3.20					.624			
Q1.4.23		-.287						-.291
Q1.5.24						-.699		
Q1.5.25						-.609		
Q1.5.26								-.728
Q1.5.27								-.805
Q1.6.29						-.379		
Q1.6.31				.401		-.446		
Q1.6.32				.639				
Q1.6.33				.741				
Q1.6.34				.548				
Q1.6.35				.470				
Q1.7.36	.730							
Q1.7.37	.644							
Q1.7.38	.583							
Q1.7.39	.620							
Q1.8.41			.691				.315	
Q1.8.42	.725							
Q1.8.43			.429	.206	.296			

Extraction Method: Principal Axis Factoring.

Rotation Method: Oblimin with Kaiser Normalization.[a]

a. Rotation converged in 9 iterations.

Structure Matrix

	Factor							
	1	2	3	4	5	6	7	8
Q1.1.5			.718				.343	-.228
Q1.1.6			.273			-.219	.750	-.259
Q1.1.7	.259	-.219	.312	.223		-.263	.534	-.294
Q1.1.8	.347	-.224	.363		.212	-.264	.619	-.267
Q1.2.9	.201	-.850		.269	.270	-.274		-.373
Q1.2.10	.234	-.630	.362	.297	.277	-.365		-.346
Q1.2.11	.250	-.324	.482	.249		-.348		-.261
Q1.2.12			.391	.223			.213	-.241
Q1.2.14		-.222	.500			-.313		-.219
Q1.2.15	.302	-.896	.234	.248	.351	-.400		-.457
Q1.2.16		-.942	.211			-.309		-.301
Q1.2.17		-.949				-.300		-.299
Q1.3.19	.253	-.230			.832			-.306
Q1.3.20	.302				.668			-.295
Q1.4.23	.369	-.533	.269	.389	.348	-.458		-.550
Q1.5.24	.277	-.305	.203		.213	-.721		-.259
Q1.5.25	.423	-.332	.330	.245	.205	-.723	.205	-.373
Q1.5.26	.270	-.339	.328	.343	.280		.209	-.771
Q1.5.27	.356	-.356	.268	.233	.406	-.410	.279	-.855
Q1.6.29		-.245	.326	.270		-.483	.266	-.255
Q1.6.31	.331	-.315	.374	.572		-.619		-.428
Q1.6.32	.234			.634				-.223
Q1.6.33	.234	-.203		.738	.230			-.240
Q1.6.34		-.272		.578				-.243
Q1.6.35	.236			.549	.315	-.247		-.344
Q1.7.36	.812	-.278	.252	.302	.334	-.365	.222	-.378
Q1.7.37	.771	-.252	.265	.270	.407	-.419	.240	-.403
Q1.7.38	.555							
Q1.7.39	.599							-.213
Q1.8.41	.235		.767			-.205	.526	-.268
Q1.8.42	.768	-.239	.276	.296	.252	-.286		-.356
Q1.8.43	.391	-.432	.558	.447	.498	-.321		-.520

Extraction Method: Principal Axis Factoring.

Rotation Method: Oblimin with Kaiser Normalization.

Factor Correlation Matrix

Factor	1	2	3	4	5	6	7	8
1	1.000	-.229	.236	.282	.323	-.332	.187	-.340
2	-.229	1.000	-.250	-.260	-.270	.354	-.120	.377
3	.236	-.250	1.000	.194	.144	-.311	.317	-.333
4	.282	-.260	.194	1.000	.212	-.259	.098	-.356
5	.323	-.270	.144	.212	1.000	-.198	.136	-.366
6	-.332	.354	-.311	-.259	-.198	1.000	-.179	.331
7	.187	-.120	.317	.098	.136	-.179	1.000	-.218
8	-.340	.377	-.333	-.356	-.366	.331	-.218	1.000

Extraction Method: Principal Axis Factoring.

Rotation Method: Oblimin with Kaiser Normalization.

Sequential Logistic Regression

Classification Table[a,b]

	Observed		Predicted		
			roc.reoffend12mth		Percentage Correct
			no	yes	
Step 0	roc.reoffend12mth	no	237	0	100.0
		yes	64	0	.0
	Overall Percentage				78.7

a. Constant is included in the model.

b. The cut value is .500

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 0	Constant	-1.309	.141	86.369	1	.000	.270

Variables not in the Equation

			Score	df	Sig.
Step 0	Variables	Agein2010	24.713	1	.000
	Overall Statistics		24.713	1	.000

Block 1: Method = Enter

Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	29.673	1	.000
	Block	29.673	1	.000
	Model	29.673	1	.000

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	281.810[a]	.094	.146

a. Estimation terminated at iteration number 5 because parameter estimates changed by less than .001.

Hosmer and Lemeshow Test

Step	Chi-square	Df	Sig.
1	5.722	7	.573

Contingency Table for Hosmer and Lemeshow Test

		roc.reoffend12mth = no		roc.reoffend12mth = yes		Total
		Observed	Expected	Observed	Expected	
Step 1	1	29	28.963	1	1.037	30
	2	29	29.853	3	2.147	32
	3	28	26.903	2	3.097	30
	4	30	29.999	5	5.001	35
	5	20	22.703	8	5.297	28
	6	25	22.207	4	6.793	29
	7	27	24.128	7	9.872	34
	8	23	24.316	14	12.684	37
	9	26	27.927	20	18.073	46

Classification Table[a]

	Observed		Predicted		
			roc.reoffend12mth		Percentage Correct
			no	yes	
Step 1	roc.reoffend12mth	no	237	0	100.0
		yes	64	0	.0
	Overall Percentage				78.7

a. The cut value is .500

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
								Lower	Upper
Step 1[a]	Agein2010	-.096	.020	22.164	1	.000	.909	.873	.946
	Constant	1.409	.555	6.439	1	.011	4.092		

a. Variable(s) entered on step 1: Agein2010.

Block 2: Method = Enter

Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	5.162	1	.023
	Block	5.162	1	.023
	Model	34.834	2	.000

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	276.648[a]	.109	.170

a. Estimation terminated at iteration number 5 because parameter estimates changed by less than .001.

Hosmer and Lemeshow Test

Step	Chi-square	df	Sig.
1	6.421	8	.600

Contingency Table for Hosmer and Lemeshow Test

		roc.reoffend12mth = no		roc.reoffend12mth = yes		Total
		Observed	Expected	Observed	Expected	
Step 1	1	29	29.146	1	.854	30
	2	29	28.137	1	1.863	30
	3	27	27.099	3	2.901	30
	4	28	26.882	3	4.118	31
	5	24	24.943	6	5.057	30
	6	24	23.298	6	6.702	30
	7	17	22.027	13	7.973	30
	8	22	20.459	8	9.541	30
	9	21	18.907	9	11.093	30
	10	16	16.103	14	13.897	30

Classification Table[a]

	Observed		Predicted		
			roc.reoffend12mth		Percentage Correct
			no	yes	
Step 1	roc.reoffend12mth	no	235	2	99.2
		yes	60	4	6.3
	Overall Percentage				79.4

a. The cut value is .500

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
								Lower	Upper
Step 1[a]	Agein2010	-.093	.021	20.088	1	.000	.912	.875	.949
	Total	.042	.019	5.074	1	.024	1.043	1.005	1.082
	Constant	.456	.701	.423	1	.516	1.577		

a. Variable(s) entered on step 1: Total.

Revised Total Score

Classification Table[a,b]

	Observed		Predicted		
			roc.reoffend12mth		Percentage Correct
			no	yes	
Step 0	roc.reoffend12mth	no	237	0	100.0
		yes	64	0	.0
	Overall Percentage				78.7

a. Constant is included in the model.

b. The cut value is .500

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 0	Constant	-1.309	.141	86.369	1	.000	.270

Variables not in the Equation

			Score	df	Sig.
Step 0	Variables	Agein2010	24.713	1	.000
	Overall Statistics		24.713	1	.000

Block 1: Method = Enter

Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	29.673	1	.000
	Block	29.673	1	.000
	Model	29.673	1	.000

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	281.810[a]	.094	.146

a. Estimation terminated at iteration number 5 because parameter estimates changed by less than .001.

Hosmer and Lemeshow Test

Step	Chi-square	df	Sig.
1	5.722	7	.573

Contingency Table for Hosmer and Lemeshow Test

		roc.reoffend12mth = no		roc.reoffend12mth = yes		Total
		Observed	Expected	Observed	Expected	
Step 1	1	29	28.963	1	1.037	30
	2	29	29.853	3	2.147	32
	3	28	26.903	2	3.097	30
	4	30	29.999	5	5.001	35
	5	20	22.703	8	5.297	28
	6	25	22.207	4	6.793	29
	7	27	24.128	7	9.872	34
	8	23	24.316	14	12.684	37
	9	26	27.927	20	18.073	46

Classification Table[a]

	Observed		Predicted		
			roc.reoffend12mth		Percentage Correct
			no	yes	
Step 1	roc.reoffend12mth	no	237	0	100.0
		yes	64	0	.0
	Overall Percentage				78.7

a. The cut value is .500

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
								Lower	Upper
Step 1[a]	Agein2010	-.096	.020	22.164	1	.000	.909	.873	.946
	Constant	1.409	.555	6.439	1	.011	4.092		

a. Variable(s) entered on step 1: Agein2010.

Block 2: Method = Enter

Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	15.070	1	.000
	Block	15.070	1	.000
	Model	44.743	2	.000

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	266.740[a]	.138	.214

a. Estimation terminated at iteration number 5 because parameter estimates changed by less than .001.

Hosmer and Lemeshow Test

Step	Chi-square	df	Sig.
1	6.814	8	.557

Contingency Table for Hosmer and Lemeshow Test

		roc.reoffend12mth = no		roc.reoffend12mth = yes		Total
		Observed	Expected	Observed	Expected	
Step 1	1	29	29.288	1	.712	30
	2	29	28.451	1	1.549	30
	3	30	27.509	0	2.491	30
	4	24	26.641	6	3.359	30
	5	26	25.352	4	4.648	30
	6	24	23.858	6	6.142	30
	7	23	22.388	7	7.612	30
	8	18	20.707	12	9.293	30
	9	19	18.168	11	11.832	30
	10	15	14.637	16	16.363	31

Classification Table[a]

	Observed		Predicted		
			roc.reoffend12mth		Percentage Correct
			no	yes	
Step 1	roc.reoffend12mth	no	228	9	96.2
		yes	53	11	17.2
	Overall Percentage				79.4

a. The cut value is .500

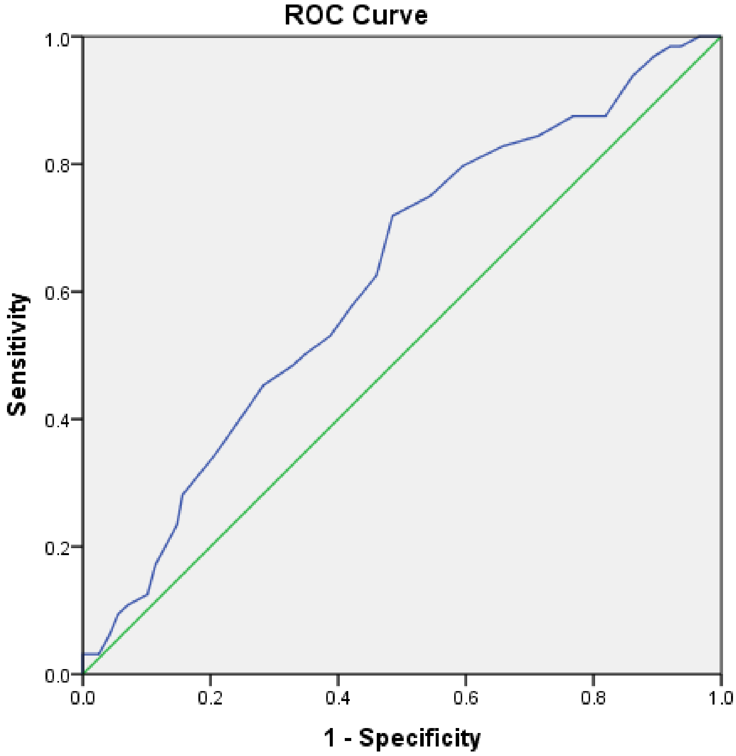
Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
								Lower	Upper
Step 1[a]	Agein2010	-.089	.021	17.698	1	.000	.915	.878	.954
	revisedtotal	.079	.021	14.353	1	.000	1.082	1.039	1.127
	Constant	.166	.656	.064	1	.800	1.181		

a. Variable(s) entered on step 1: revisedtotal.

ROC Analyses

LS/CMI Total Score



Diagonal segments are produced by ties.

Area Under the Curve

Test Result Variable(s): Total

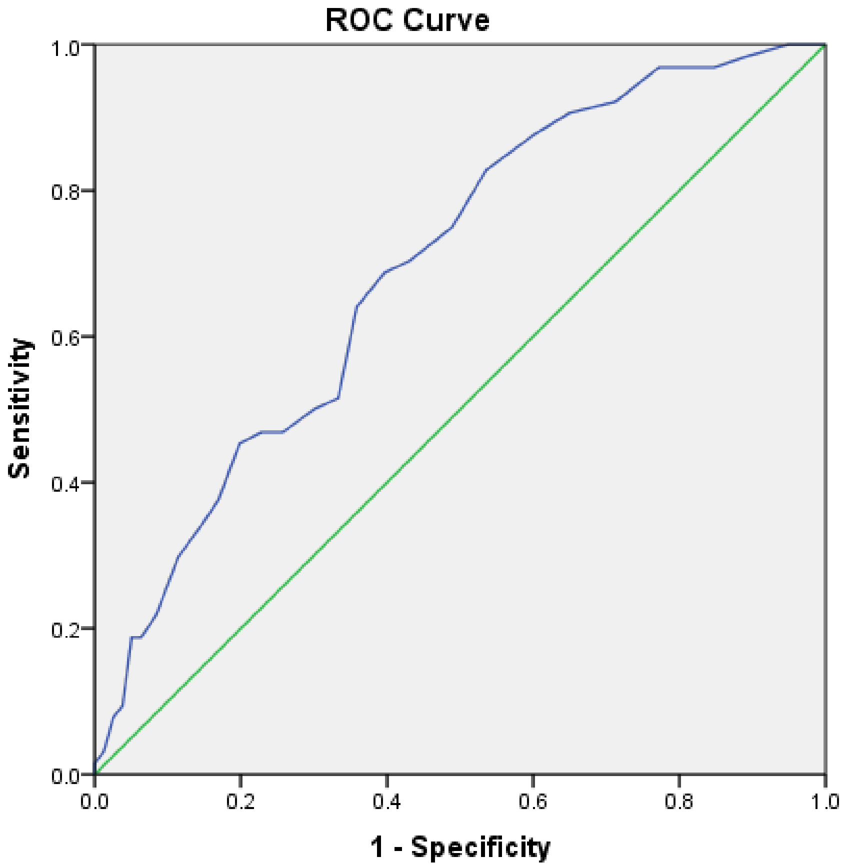
Area	Std. Error[a]	Asymptotic Sig.[b]	Asymptotic 95% Confidence Interval	
			Lower Bound	Upper Bound
.621	.038	.003	.546	.696

The test result variable(s): Total has at least one tie between the positive actual state group and the negative actual state group. Statistics may be biased.

a. Under the nonparametric assumption

b. Null hypothesis: true area = 0.5

LS/CMI Revised Total Score



Diagonal segments are produced by ties.

Area Under the Curve

Test Result Variable(s): revisedtotal

Area	Std. Error[a]	Asymptotic Sig.[b]	Asymptotic 95% Confidence Interval	
			Lower Bound	Upper Bound
.693	.035	.000	.625	.762

The test result variable(s): revisedtotal has at least one tie between the positive actual state group and the negative actual state group. Statistics may be biased.

a. Under the nonparametric assumption

b. Null hypothesis: true area = 0.5

Appendix C

SPSS Output for Chapter 4 (Study 3)

Study One

Descriptive Analyses

Sex

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	237	78.7	78.7	78.7
	Female	64	21.3	21.3	100.0
	Total	301	100.0	100.0	

Location

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Prison	86	28.6	28.6	28.6
	Community Corrections	215	71.4	71.4	100.0
	Total	301	100.0	100.0	

Location[a]

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Prison	79	33.3	33.3	33.3
	Community Corrections	158	66.7	66.7	100.0
	Total	237	100.0	100.0	

a. Sex = Male

Location[a]

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Prison	7	11	11	11
	Community Corrections	57	89.1	89.1	100.0
	Total	64	100.0	100.0	

a. Sex = Female

ATSI

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	262	87.0	87.0	87.0
	Yes	39	13.0	13.0	100.0
	Total	301	100.0	100.0	

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
age2013	301	18	84	32.97	11.656
Valid N (listwise)	301				

PriorOffences

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	38	12.6	12.6	12.6
	Yes	263	87.4	87.4	100.0
	Total	301	100.0	100.0	

PriorCustodial

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	161	53.5	53.5	53.5
	Yes	140	46.5	46.5	100.0
	Total	301	100.0	100.0	

Category[a]

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Sexual	14	5.9	5.9	5.9
	Violent	91	38.4	38.4	44.3
	Property (incl. theft)	36	15.2	15.2	59.5
	Drug Offences	18	7.6	7.6	67.1
	Traffic Offences	58	24.5	24.5	91.6
	Other	20	8.4	8.4	100.0
	Total	237	100.0	100.0	

a. Sex = Male

Category[a]

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Violent	19	29.7	29.7	29.7
	Property (incl. theft)	16	25.0	25.0	54.7
	Drug Offences	4	6.3	6.3	60.9
	Traffic Offences	17	26.6	26.6	87.5
	Other	8	12.5	12.5	100.0
	Total	64	100.0	100.0	

a. Sex = Female

Internal Reliability
All items (78)

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.937	.932	78

Item Statistics

	Mean	Std. Deviation	N
A1	.62	.487	301
A2	.49	.501	301
A3	.12	.329	301
A4	.89	.309	301
A5	.47	.500	301
A6	.84	.364	301
A7	.66	.473	301
A8	.45	.498	301
A9	.46	.499	301
A10	.07	.261	301
A11	.67	.472	301
A12	.45	.499	301
A13	.06	.231	301
A14	.33	.472	301
B1	.37	.482	301
B2	.60	.490	301
B3	.09	.281	301
B4	.06	.244	301
B5	.07	.255	301
B6	.54	.499	301
B7	.65	.478	301
B8	.62	.485	301
B9	.11	.309	301
B10	.17	.373	301
B11	.48	.500	301
B12	.42	.782	301
B13	.44	.497	301
C1	.68	.468	301
C2	.70	.460	301
C3	.50	.501	301
C4	.57	.496	301
C5	.35	.476	301
C6	.19	.390	301
C7	.17	.376	301
C8	.58	.494	301

C9	.56	.497	301
C10	.39	.489	301
C11	.26	.439	301
C12	.26	.437	301
D1	.76	.429	301
D2	.65	.476	301
D3	.67	.469	301
D4	.58	.494	301
E1	.58	.495	301
E2	.11	.317	301
E3	.28	.449	301
E4	.04	.196	301
E5	.05	.218	301
E6	.51	.501	301
E7	.17	.376	301
E8	.18	.384	301
E9	.32	.468	301
E10	.41	.492	301
E11	.54	.499	301
E12	.58	.495	301
E13	.54	.499	301
E14	.62	.485	301
F1	.42	.494	301
F2	.61	.488	301
F3	.33	.472	301
F4	.22	.417	301
F5	.26	.437	301
F6	.50	.501	301
F7	.52	.500	301
G1	.08	.271	301
G2	.59	.493	301
G3	.08	.276	301
G4	.51	.501	301
G5	.60	.491	301
G6	.63	.482	301
G7	.34	.475	301
G8	.56	.497	301
G9	.62	.487	301
G10	.51	.501	301
G11	.69	.463	301
G12	.53	.500	301
G13	.58	.494	301
G14	.41	.492	301

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
A1	32.98	205.453	.481	.935
A2	33.11	204.481	.535	.935
A3	33.48	208.557	.393	.936
A4	32.70	210.796	.168	.937
A5	33.13	205.786	.443	.936
A6	32.75	209.746	.239	.937
A7	32.93	206.189	.440	.936
A8	33.15	204.843	.513	.935
A9	33.14	204.816	.513	.935
A10	33.52	209.777	.338	.936
A11	32.93	208.118	.298	.936
A12	33.15	208.619	.245	.937
A13	33.54	213.456	-.165	.938
A14	33.27	206.696	.404	.936
B1	33.23	206.639	.398	.936
B2	32.99	207.133	.356	.936
B3	33.51	211.404	.111	.937
B4	33.53	212.410	-.010	.937
B5	33.53	211.843	.065	.937
B6	33.06	204.216	.556	.935
B7	32.95	204.688	.546	.935
B8	32.97	204.213	.573	.935
B9	33.49	211.091	.135	.937
B10	33.43	209.653	.241	.937
B11	33.12	205.162	.487	.935
B12	33.18	204.379	.331	.937
B13	33.16	205.703	.452	.936
C1	32.92	209.074	.229	.937
C2	32.90	205.063	.540	.935
C3	33.10	209.999	.148	.937
C4	33.03	211.439	.049	.938
C5	33.25	209.343	.205	.937
C6	33.41	208.823	.304	.936
C7	33.43	209.112	.289	.936
C8	33.01	204.760	.523	.935
C9	33.04	204.675	.525	.935
C10	33.21	204.644	.537	.935
C11	33.34	206.238	.473	.936
C12	33.34	207.986	.335	.936
D1	32.84	208.821	.273	.936
D2	32.94	205.600	.481	.935

D3	32.92	204.517	.570	.935
D4	33.02	205.910	.440	.936
E1	33.02	207.180	.349	.936
E2	33.49	210.324	.214	.937
E3	33.32	207.445	.367	.936
E4	33.56	211.721	.111	.937
E5	33.55	211.329	.161	.937
E6	33.09	210.166	.136	.937
E7	33.43	210.852	.128	.937
E8	33.42	209.978	.204	.937
E9	33.28	208.667	.259	.937
E10	33.19	207.189	.351	.936
E11	33.06	204.250	.553	.935
E12	33.02	204.393	.548	.935
E13	33.05	202.650	.669	.934
E14	32.97	204.506	.552	.935
F1	33.18	206.188	.420	.936
F2	32.99	206.293	.418	.936
F3	33.27	208.716	.254	.937
F4	33.38	207.549	.389	.936
F5	33.34	208.513	.292	.936
F6	33.10	206.014	.426	.936
F7	33.07	202.208	.698	.934
G1	33.52	210.517	.229	.937
G2	33.01	204.230	.562	.935
G3	33.51	209.831	.311	.936
G4	33.08	207.323	.334	.936
G5	33.00	205.553	.469	.936
G6	32.96	203.775	.609	.935
G7	33.26	206.424	.421	.936
G8	33.04	202.415	.688	.934
G9	32.98	204.573	.545	.935
G10	33.08	202.563	.672	.934
G11	32.91	206.351	.438	.936
G12	33.06	203.606	.599	.935
G13	33.01	206.466	.401	.936
G14	33.19	206.343	.411	.936

Intraclass Correlation Coefficient

	Intraclass Correlation[a]	95% Confidence Interval		F Test with True Value 0			
		Lower Bound	Upper Bound	Value	df1	df2	Sig
Single Measures	.160[b]	.138	.185	15.808	300	23100	.000
Average Measures	.937[c]	.926	.947	15.808	300	23100	.000

Two-way mixed effects model where people effects are random and measures effects are fixed.

a. Type C intraclass correlation coefficients using a consistency definition-the between-measure variance is excluded from the denominator variance.

b. The estimator is the same, whether the interaction effect is present or not.

c. This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.

With 23 items removed from the scale (ARNI)

Scale: total

Case Processing Summary

		N	%
Cases	Valid	301	100.0
	Excluded[a]	0	.0
	Total	301	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.935	.934	49

Item Statistics

	Mean	Std. Deviation	N
A1	.62	.487	301
A2	.49	.501	301
A3	.12	.329	301
A4	.89	.309	301
A5	.47	.500	301
A7	.66	.473	301
A8	.45	.498	301
A9	.46	.499	301
A10	.07	.261	301

A11	.67	.472	301
A14	.33	.472	301
B2	.60	.490	301
B6	.54	.499	301
B7	.65	.478	301
B8	.62	.485	301
B311	.53	.500	301
B12	.39	.488	301
B13	.44	.497	301
C1C2	.86	.344	301
C3C8	.80	.400	301
C4C9	.85	.357	301
C5C10	.56	.497	301
C6C11	.34	.475	301
C7C12	.33	.471	301
D2	.65	.476	301
D3	.67	.469	301
D4	.58	.494	301
E1	.58	.495	301
E23	.32	.466	301
E6E9	.65	.477	301
E7E10	.50	.501	301
E11	.54	.499	301
E12	.58	.495	301
E13	.54	.499	301
E14	.62	.485	301
F1	.42	.494	301
F2	.61	.488	301
F4	.22	.417	301
F56	.53	.500	301
F7	.52	.500	301
G2	.59	.493	301
G4	.51	.501	301
G5	.60	.491	301
G6	.63	.482	301
G7	.34	.475	301
G8	.56	.497	301
G9	.62	.487	301
G11	.69	.463	301
G12	.53	.500	301

Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	.538	.073	.894	.821	12.227	.028	49

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
A1	25.76	123.864	.488	.934
A2	25.89	123.291	.526	.933
A3	26.25	126.496	.376	.934
A4	25.48	128.177	.160	.935
A5	25.91	124.125	.450	.934
A7	25.71	124.433	.448	.934
A8	25.93	123.332	.525	.933
A9	25.92	123.207	.536	.933
A10	26.30	127.452	.317	.935
A11	25.71	126.114	.288	.935
A14	26.04	124.941	.401	.934
B2	25.77	125.097	.370	.934
B6	25.84	122.677	.584	.933
B7	25.73	123.092	.572	.933
B8	25.75	122.594	.611	.933
B311	25.84	123.339	.522	.933
B12	25.99	124.086	.465	.934
B13	25.94	123.916	.473	.934
C1C2	25.51	126.251	.391	.934
C3C8	25.57	125.732	.390	.934
C4C9	25.52	126.797	.306	.935
C5C10	25.81	124.659	.404	.934
C6C11	26.03	124.572	.433	.934
C7C12	26.05	125.184	.378	.934
D2	25.72	123.915	.495	.934
D3	25.70	123.084	.584	.933
D4	25.79	124.171	.452	.934
E1	25.80	125.402	.338	.935
E23	26.06	125.310	.371	.934
E6E9	25.72	127.054	.196	.936
E7E10	25.88	124.906	.378	.934
E11	25.84	122.877	.566	.933
E12	25.80	123.029	.557	.933
E13	25.83	121.575	.688	.932
E14	25.75	122.921	.579	.933

F1	25.96	124.975	.377	.934
F2	25.76	125.068	.374	.934
F4	26.15	125.763	.369	.934
F56	25.84	125.334	.340	.935
F7	25.85	121.421	.700	.932
G2	25.79	122.948	.567	.933
G4	25.86	125.387	.335	.935
G5	25.78	124.234	.449	.934
G6	25.74	122.279	.645	.932
G7	26.03	125.072	.385	.934
G8	25.81	121.352	.711	.932
G9	25.76	123.338	.538	.933
G11	25.68	124.970	.406	.934
G12	25.84	122.321	.617	.933

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
26.38	129.389	11.375	49

Hotelling's T-Squared Test

Hotelling's T-Squared	F	df1	df2	Sig
2915.280	51.220	48	253	.000

Intraclass Correlation Coefficient

	Intraclass Correlation[b]	95% Confidence Interval		F Test with True Value 0			
		Lower Bound	Upper Bound	Value	df1	df2	Sig
Single Measures	.227[a]	.199	.260	15.403	300	14400	.000
Average Measures	.935[c]	.924	.945	15.403	300	14400	.000

Two-way mixed effects model where people effects are random and measures effects are fixed.

a. The estimator is the same, whether the interaction effect is present or not.

b. Type C intraclass correlation coefficients using a consistency definition-the between-measure variance is excluded from the denominator variance.

c. This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.

Subscales on the ARNI

Antisocial Associates

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.905	.905	6

Item Statistics

	Mean	Std. Deviation	N
E11	.54	.499	301
E12	.58	.495	301
E13	.54	.499	301
E14	.62	.485	301
F7	.52	.500	301
G8	.56	.497	301

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
E11	2.83	4.339	.682	.620	.897
E12	2.79	4.517	.592	.415	.909
E13	2.83	4.063	.843	.792	.873
E14	2.75	4.263	.754	.668	.886
F7	2.85	4.270	.720	.535	.891
G8	2.81	4.054	.853	.797	.871

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
3.37	6.008	2.451	6

Hotelling's T-Squared Test

Hotelling's T-Squared	F	df1	df2	Sig
30.042	5.928	5	296	.000

Intraclass Correlation Coefficient

	Intraclass Correlation[b]	95% Confidence Interval		F Test with True Value 0			
		Lower Bound	Upper Bound	Value	df1	df2	Sig
Single Measures	.614[a]	.569	.660	10.559	300	1500	.000
Average Measures	.905[c]	.888	.921	10.559	300	1500	.000

Two-way mixed effects model where people effects are random and measures effects are fixed.

a. The estimator is the same, whether the interaction effect is present or not.

b. Type C intraclass correlation coefficients using a consistency definition-the between-measure variance is excluded from the denominator variance.

c. This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.

Adult Criminal History

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.880	.874	6

Item Statistics

	Mean	Std. Deviation	N
A4	.89	.309	301
A5	.47	.500	301
A7	.66	.473	301
A8	.45	.498	301
A9	.46	.499	301
G12	.53	.500	301

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
A4	2.57	4.346	.384	.228	.899
A5	2.99	3.447	.668	.448	.864
A7	2.80	3.435	.728	.548	.853
A8	3.02	3.276	.783	.666	.843
A9	3.01	3.300	.765	.629	.846
G12	2.93	3.255	.794	.702	.841

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
3.46	4.936	2.222	6

Hotelling's T-Squared Test

Hotelling's T-Squared	F	df1	df2	Sig
331.018	65.321	5	296	.000

Intraclass Correlation Coefficient

	Intraclass Correlation[b]	95% Confidence Interval		F Test with True Value 0			
		Lower Bound	Upper Bound	Value	df1	df2	Sig
Single Measures	.551[a]	.502	.600	8.353	300	1500	.000
Average Measures	.880[c]	.858	.900	8.353	300	1500	.000

Two-way mixed effects model where people effects are random and measures effects are fixed.

a. The estimator is the same, whether the interaction effect is present or not.

b. Type C intraclass correlation coefficients using a consistency definition-the between-measure variance is excluded from the denominator variance.

c. This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.

Substance Use

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.785	.798	6

Item Statistics

	Mean	Std. Deviation	N
C1C2	.86	.344	301
C3C8	.80	.400	301
C4C9	.85	.357	301
C5C10	.56	.497	301
C6C11	.34	.475	301
C7C12	.33	.471	301

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
C1C2	2.88	2.410	.614	.538	.741
C3C8	2.95	2.184	.709	.648	.712
C4C9	2.90	2.459	.532	.414	.756
C5C10	3.19	2.079	.598	.404	.737
C6C11	3.41	2.295	.460	.281	.774
C7C12	3.42	2.404	.382	.161	.793

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
3.75	3.183	1.784	6

Hotelling's T-Squared Test

Hotelling's T-Squared	F	df1	df2	Sig
526.584	103.913	5	296	.000

Intraclass Correlation Coefficient

	Intraclass Correlation[b]	95% Confidence Interval		F Test with True Value 0			
		Lower Bound	Upper Bound	Value	df1	df2	Sig
Single Measures	.379[a]	.328	.433	4.656	300	1500	.000
Average Measures	.785[c]	.745	.821	4.656	300	1500	.000

Two-way mixed effects model where people effects are random and measures effects are fixed.

a. The estimator is the same, whether the interaction effect is present or not.

b. Type C intraclass correlation coefficients using a consistency definition-the between-measure variance is excluded from the denominator variance.

c. This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.

Frequency of Employment

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.921	.921	3

Item Statistics

	Mean	Std. Deviation	N
B7	.65	.478	301
B8	.62	.485	301
G6	.63	.482	301

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
B7	1.26	.839	.840	.709	.885
B8	1.28	.837	.826	.682	.897
G6	1.27	.826	.852	.726	.875

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
1.91	1.805	1.343	3

Hotelling's T-Squared Test

Hotelling's T-Squared	F	df1	df2	Sig
1.620	.807	2	299	.447

Intraclass Correlation Coefficient

	Intraclass Correlation[b]	95% Confidence Interval		F Test with True Value 0			
		Lower Bound	Upper Bound	Value	df1	df2	Sig
Single Measures	.795[a]	.758	.828	12.627	300	600	.000
Average Measures	.921[c]	.904	.935	12.627	300	600	.000

Two-way mixed effects model where people effects are random and measures effects are fixed.

a. The estimator is the same, whether the interaction effect is present or not.

b. Type C intraclass correlation coefficients using a consistency definition-the between-measure variance is excluded from the denominator variance.

c. This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.

Juvenile Criminal History

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.871	.871	3

Item Statistics

	Mean	Std. Deviation	N
A1	.62	.487	301
A2	.49	.501	301
G2	.59	.493	301

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
A1	1.07	.795	.818	.673	.758
A2	1.21	.817	.743	.593	.826
G2	1.10	.859	.699	.507	.865

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
1.69	1.741	1.319	3

Hotelling's T-Squared Test

Hotelling's T-Squared	F	df1	df2	Sig
46.110	22.978	2	299	.000

Intraclass Correlation Coefficient

	Intraclass Correlation[b]	95% Confidence Interval		F Test with True Value 0			
		Lower Bound	Upper Bound	Value	df1	df2	Sig
Single Measures	.692[a]	.642	.738	7.725	300	600	.000
Average Measures	.871[c]	.843	.894	7.725	300	600	.000

Two-way mixed effects model where people effects are random and measures effects are fixed.

a. The estimator is the same, whether the interaction effect is present or not.

b. Type C intraclass correlation coefficients using a consistency definition-the between-measure variance is excluded from the denominator variance.

c. This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.

Instrumental Aggression

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.674	.673	3

Item Statistics

	Mean	Std. Deviation	N
F56	.53	.500	301
G9	.62	.487	301
G11	.69	.463	301

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
F56	1.31	.594	.556	.311	.482
G9	1.23	.682	.439	.203	.640
G11	1.15	.697	.468	.239	.603

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
1.84	1.272	1.128	3

Hotelling's T-Squared Test

Hotelling's T-Squared	F	df1	df2	Sig
30.185	15.042	2	299	.000

Intraclass Correlation Coefficient

	Intraclass Correlation[b]	95% Confidence Interval		F Test with True Value 0			
		Lower Bound	Upper Bound	Value	df1	df2	Sig
Single Measures	.408[a]	.337	.478	3.066	300	600	.000
Average Measures	.674[c]	.604	.733	3.066	300	600	.000

Two-way mixed effects model where people effects are random and measures effects are fixed.

a. The estimator is the same, whether the interaction effect is present or not.

b. Type C intraclass correlation coefficients using a consistency definition-the between-measure variance is excluded from the denominator variance.

c. This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.

Current Employment

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.887	.888	4

Item Statistics

	Mean	Std. Deviation	N
B6	.54	.499	301
B311	.53	.500	301
B12	.39	.488	301
B13	.44	.497	301

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
B6	1.36	1.797	.669	.453	.886
B311	1.36	1.752	.711	.509	.871
B12	1.50	1.651	.839	.753	.822
B13	1.46	1.669	.800	.719	.837

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
1.89	2.942	1.715	4

Hotelling's T-Squared Test

Hotelling's T-Squared	F	df1	df2	Sig
57.909	19.174	3	298	.000

Intraclass Correlation Coefficient

	Intraclass Correlation[b]	95% Confidence Interval		F Test with True Value 0			
		Lower Bound	Upper Bound	Value	df1	df2	Sig
Single Measures	.663[a]	.616	.708	8.871	300	900	.000
Average Measures	.887[c]	.865	.907	8.871	300	900	.000

Two-way mixed effects model where people effects are random and measures effects are fixed.

a. The estimator is the same, whether the interaction effect is present or not.

b. Type C intraclass correlation coefficients using a consistency definition-the between-measure variance is excluded from the denominator variance.

c. This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.

Leisure, Recreation, & Schooling History

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.707	.710	4

Item Statistics

	Mean	Std. Deviation	N
B2	.60	.490	301
D2	.65	.476	301
D3	.67	.469	301
D4	.58	.494	301

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
B2	1.91	1.375	.321	.113	.746
D2	1.86	1.134	.614	.447	.568
D3	1.84	1.134	.629	.458	.560
D4	1.93	1.256	.437	.220	.679

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
2.51	1.984	1.409	4

Hotelling's T-Squared Test

Hotelling's T-Squared	F	df1	df2	Sig
11.650	3.857	3	298	.010

Intraclass Correlation Coefficient

	Intraclass Correlation[b]	95% Confidence Interval		F Test with True Value 0			
		Lower Bound	Upper Bound	Value	df1	df2	Sig
Single Measures	.377[a]	.317	.439	3.419	300	900	.000
Average Measures	.707[c]	.650	.758	3.419	300	900	.000

Two-way mixed effects model where people effects are random and measures effects are fixed.

a. The estimator is the same, whether the interaction effect is present or not.

b. Type C intraclass correlation coefficients using a consistency definition-the between-measure variance is excluded from the denominator variance.

c. This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.

<u>Antisocial Cognitions</u>

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.622	.622	4

Item Statistics

	Mean	Std. Deviation	N
F1	.42	.494	301
F2	.61	.488	301
F4	.22	.417	301
G4	.51	.501	301

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
F1	1.35	1.055	.394	.183	.557
F2	1.16	.992	.482	.240	.489
F4	1.54	1.195	.362	.133	.580
G4	1.25	1.063	.374	.152	.574

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
1.77	1.699	1.303	4

Hotelling's T-Squared Test

Hotelling's T-Squared	F	df1	df2	Sig
169.491	56.120	3	298	.000

Intraclass Correlation Coefficient

	Intraclass Correlation[b]	95% Confidence Interval		F Test with True Value 0			
		Lower Bound	Upper Bound	Value	df1	df2	Sig
Single Measures	.291[a]	.232	.354	2.643	300	900	.000
Average Measures	.622[c]	.547	.687	2.643	300	900	.000

Two-way mixed effects model where people effects are random and measures effects are fixed.

a. The estimator is the same, whether the interaction effect is present or not.

b. Type C intraclass correlation coefficients using a consistency definition-the between-measure variance is excluded from the denominator variance.

c. This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.

Familial Relationships & Educational Support

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.660	.660	6

Item Statistics

	Mean	Std. Deviation	N
E1	.58	.495	301
E23	.32	.466	301
E6E9	.65	.477	301
E7E10	.50	.501	301
G5	.60	.491	301
G7	.34	.475	301

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
E1	2.40	2.328	.367	.146	.626
E23	2.66	2.364	.381	.167	.620
E6E9	2.33	2.341	.381	.180	.620
E7E10	2.49	2.224	.436	.214	.600
G5	2.38	2.284	.405	.196	.612
G7	2.64	2.372	.361	.143	.627

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
2.98	3.126	1.768	6

Hotelling's T-Squared Test

Hotelling's T-Squared	F	df1	df2	Sig
146.922	28.993	5	296	.000

Intraclass Correlation Coefficient

	Intraclass Correlation[b]	95% Confidence Interval		F Test with True Value 0			
		Lower Bound	Upper Bound	Value	df1	df2	Sig
Single Measures	.244[a]	.198	.296	2.940	300	1500	.000
Average Measures	.660[c]	.597	.716	2.940	300	1500	.000

Two-way mixed effects model where people effects are random and measures effects are fixed.

a. The estimator is the same, whether the interaction effect is present or not.

b. Type C intraclass correlation coefficients using a consistency definition-the between-measure variance is excluded from the denominator variance.

c. This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.

Factor Analysis

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.893
Bartlett's Test of Sphericity	Approx. Chi-Square	7439.072
	df	990
	Sig.	.000

Total Variance Explained

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings[a]
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	11.990	26.645	26.645	11.612	25.805	25.805	7.270
2	3.591	7.980	34.625	3.257	7.239	33.044	4.953
3	2.464	5.475	40.100	2.074	4.608	37.652	3.657
4	2.139	4.754	44.854	1.794	3.987	41.638	6.333
5	1.867	4.148	49.002	1.386	3.081	44.719	4.405
6	1.740	3.866	52.868	1.367	3.038	47.757	3.713
7	1.444	3.209	56.077	1.030	2.289	50.045	5.371
8	1.383	3.074	59.151	.849	1.886	51.931	4.400
9	1.213	2.696	61.847	.800	1.779	53.710	2.625
10	1.184	2.630	64.477	.702	1.559	55.269	2.834
11	1.033	2.294	66.772				
12	.959	2.130	68.902				
13	.907	2.015	70.917				
14	.843	1.874	72.790				
15	.773	1.718	74.508				
16	.739	1.642	76.150				
17	.728	1.619	77.768				
18	.708	1.573	79.342				
19	.673	1.496	80.838				
20	.609	1.353	82.190				
21	.601	1.335	83.525				
22	.581	1.292	84.817				
23	.528	1.173	85.991				
24	.500	1.112	87.103				
25	.480	1.067	88.170				
26	.462	1.026	89.196				
27	.439	.976	90.172				
28	.412	.916	91.089				
29	.383	.852	91.941				
30	.362	.804	92.745				

31	.329	.732	93.477				
32	.320	.711	94.188				
33	.303	.674	94.862				
34	.287	.638	95.500				
35	.280	.622	96.123				
36	.255	.566	96.689				
37	.234	.520	97.209				
38	.222	.493	97.702				
39	.203	.451	98.153				
40	.185	.411	98.564				
41	.156	.346	98.911				
42	.144	.320	99.230				
43	.132	.294	99.524				
44	.117	.260	99.784				
45	.097	.216	100.000				

Extraction Method: Principal Axis Factoring.

a. When factors are correlated, sums of squared loadings cannot be added to obtain a total variance.

Pattern Matrix[a]

	Factor									
	1	2	3	4	5	6	7	8	9	10
A1					-.898					
A2					-.731					
A4		.465								
A5		.631								
A7		.749								
A8		.799								
A9		.732								
B2								-.321		
B6				.406			.483			
B7				.859						
B8				.813						
B311							.571			
B12							.968			
B13							.890			
C1C2			.743							
C3C8			.881							
C4C9			.673							
C5C10			.543							
C6C11			.311							
C7C12										
D2								-.753		

D3								-.522		
D4										
E1										
E23										.353
E6E9										.556
E7E10										.436
E11	.691									
E12	.453									
E13	.772									
E14	.855									
F1									.428	
F2									.464	
F4									.390	
F56						.862				
F7	.562									
G2					-.669					
G4									.448	
G5										.360
G6				.804						
G7										.360
G8	.770									
G9						.412				
G11						.524				
G12		.751								

Extraction Method: Principal Axis Factoring.

Rotation Method: Oblimin with Kaiser Normalization.

a. Rotation converged in 11 iterations.

Appendix C

Correlations

Variable	Age	Prior Offences	Prior Custodial	Total Score	AA	ACH	CE	SU	FoE	JCH	LRSH	IA	FRES	AC
Age	1	-.006	.025	-.294**	-.293**	.011	-.244**	-.079	-.265**	-.266**	-.390**	-.183**	-.128	-.046
Prior Offences		1	.288**	.233**	.066	.402**	.026	.170*	.065	.180*	.064	.232**	.124	.060
Prior Custodial			1	.475**	.251**	.693**	.137	.176*	.231**	.389**	.239**	.313**	.168*	.262**
Total Score				1	.776**	.553**	.633**	.563**	.702**	.534**	.677**	.571**	.627**	.498**
AA					1	.283**	.438**	.321**	.508**	.368**	.506**	.335**	.457**	.354**
ACH						1	.158*	.252**	.227**	.379**	.237**	.310**	.175*	.170*
CE							1	.220**	.597**	.179*	.459**	.253**	.348**	.274**
SU								1	.319**	.215**	.365**	.346**	.224**	.158*
FoE									1	.230**	.521**	.332**	.385**	.321**
JCH										1	.267**	.309**	.222**	.201**

Appendix C

LRSH	1	.253**	.353**	.286**
IA		1	.388**	.177*
FRES			1	.303**
AC				1

NB: AA = Antisocial Associates, ACH = Adult Criminal History, CE = Current Employment, SU = Substance Use, FoE = Frequency of Employment, JCH = Juvenile Criminal History, LRSH = Leisure, Recreation & Schooling History, IA = Instrumental Aggression, FRES = Familial Relationships & Educational Support, AC = Antisocial Cognitions

* $p < .05$. ** $p < .01$.

Study 2

Frequencies

Sex

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	149	74.5	74.5	74.5
	Female	51	25.5	25.5	100.0
	Total	200	100.0	100.0	

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
age2013	200	17	84	32.77	11.171
Valid N (listwise)	200				

Location

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Prison	24	12.0	12.0	12.0
	Community Corrections	176	88.0	88.0	100.0
	Total	200	100.0	100.0	

Location[a]

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Prison	20	13.4	13.4	13.4
	Community Corrections	129	86.6	86.6	100.0
	Total	149	100.0	100.0	

a. Sex = Male

Location[a]

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Prison	4	7.8	7.8	7.8
	Community Corrections	47	92.2	92.2	100.0
	Total	51	100.0	100.0	

a. Sex = Female

PriorOffences

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	23	11.5	11.5	11.5
	Yes	177	88.5	88.5	100.0
	Total	200	100.0	100.0	

PriorOffences[a]

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	10	6.7	6.7	6.7
	Yes	139	93.3	93.3	100.0
	Total	149	100.0	100.0	

a. Sex = Male

PriorOffences[a]

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	13	25.5	25.5	25.5
	Yes	38	74.5	74.5	100.0
	Total	51	100.0	100.0	

a. Sex = Female

PriorCustodial

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	122	61.0	61.0	61.0
	Yes	78	39.0	39.0	100.0
	Total	200	100.0	100.0	

PriorCustodial[a]

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	81	54.4	54.4	54.4
	Yes	68	45.6	45.6	100.0
	Total	149	100.0	100.0	

a. Sex = Male

PriorCustodial[a]

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	41	80.4	80.4	80.4
	Yes	10	19.6	19.6	100.0
	Total	51	100.0	100.0	

a. Sex = Female

Category[a]

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Sexual	4	2.7	2.7	2.7
	Violent	55	36.9	36.9	39.6
	Property (incl. theft)	22	14.8	14.8	54.4
	Drug Offences	13	8.7	8.7	63.1
	Traffic Offences	44	29.5	29.5	92.6
	Other	11	7.4	7.4	100.0
	Total	149	100.0	100.0	

a. Sex = Male

Category[a]

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Violent	14	27.5	27.5	27.5
	Property (incl. theft)	12	23.5	23.5	51.0
	Drug Offences	3	5.9	5.9	56.9
	Traffic Offences	15	29.4	29.4	86.3
	Other	7	13.7	13.7	100.0
	Total	51	100.0	100.0	

a. Sex = Female

ROC Analyses

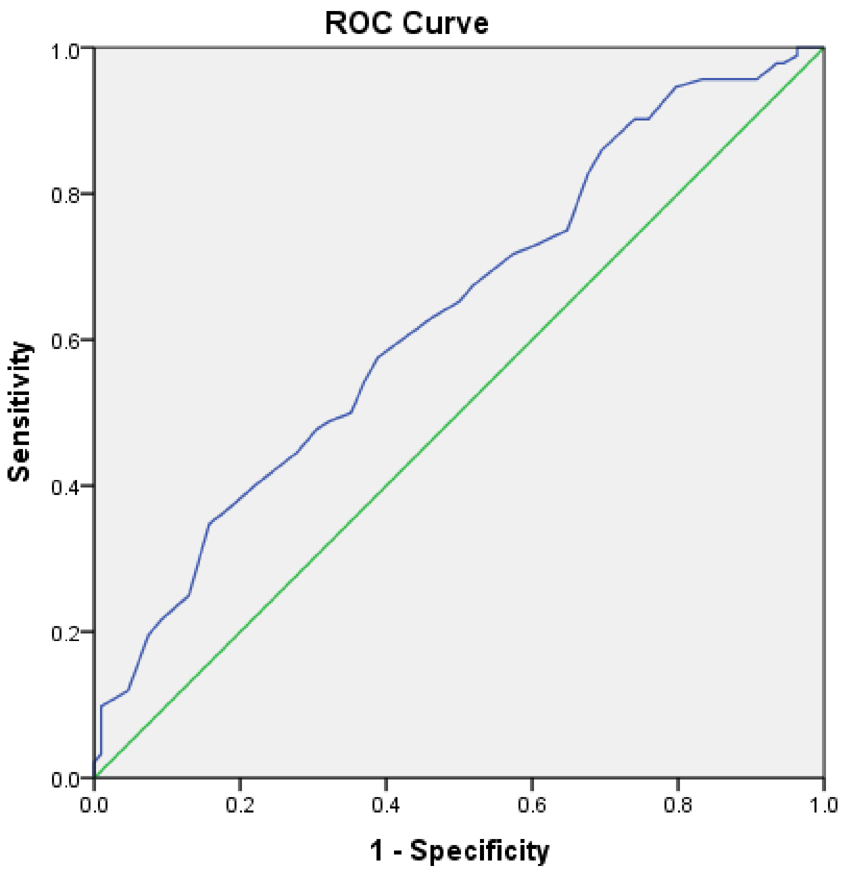
Total Score

Case Processing Summary

ReoffendYN	Valid N (listwise)
Positive[a]	92
Negative	108

Larger values of the test result variable(s) indicate stronger evidence for a positive actual state.

a. The positive actual state is Yes.



Diagonal segments are produced by ties.

Area Under the Curve

Test Result Variable(s): tenfacttot

Area	Std. Error[a]	Asymptotic Sig.[b]	Asymptotic 95% Confidence Interval	
			Lower Bound	Upper Bound
.633	.039	.001	.556	.710

The test result variable(s): tenfacttot has at least one tie between the positive actual state group and the negative actual state group. Statistics may be biased.

a. Under the nonparametric assumption

b. Null hypothesis: true area = 0.5

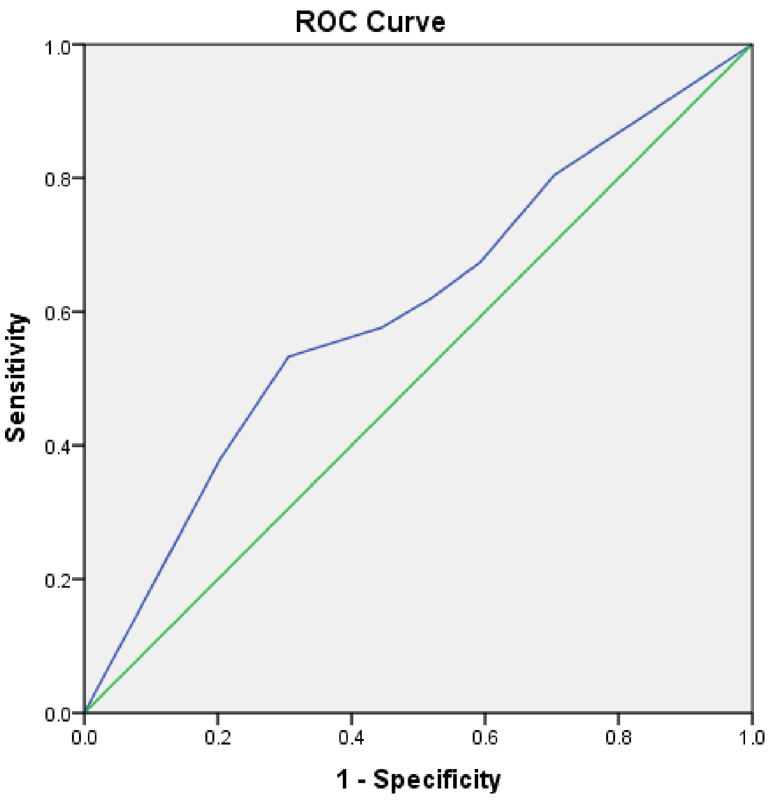
Antisocial Associates

Case Processing Summary

ReoffendYN	Valid N (listwise)
Positive[a]	92
Negative	108

Larger values of the test result variable(s) indicate stronger evidence for a positive actual state.

a. The positive actual state is Yes.



Diagonal segments are produced by ties.

Area Under the Curve

Test Result Variable(s): f101

Area	Std. Error[a]	Asymptotic Sig.[b]	Asymptotic 95% Confidence Interval	
			Lower Bound	Upper Bound
.604	.040	.011	.525	.683

The test result variable(s): f101 has at least one tie between the positive actual state group and the negative actual state group. Statistics may be biased.

a. Under the nonparametric assumption

b. Null hypothesis: true area = 0.5

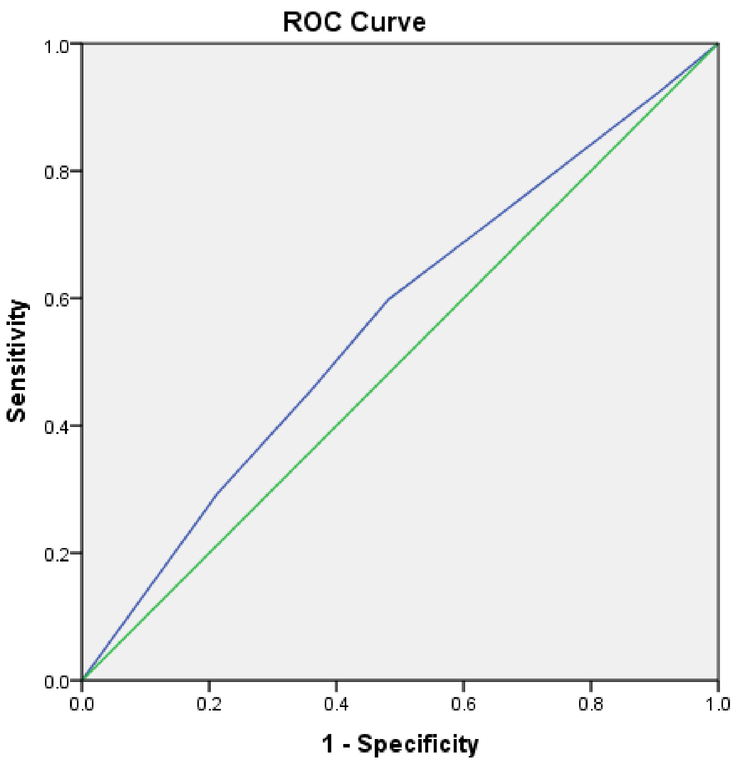
Adult Criminal History

Case Processing Summary

ReoffendYN	Valid N (listwise)
Positive[a]	92
Negative	108

Larger values of the test result variable(s) indicate stronger evidence for a positive actual state.

a. The positive actual state is Yes.



Diagonal segments are produced by ties.

Area Under the Curve

Test Result Variable(s): f102

Area	Std. Error[a]	Asymptotic Sig.[b]	Asymptotic 95% Confidence Interval	
			Lower Bound	Upper Bound
.563	.041	.124	.483	.643

The test result variable(s): f102 has at least one tie between the positive actual state group and the negative actual state group. Statistics may be biased.

a. Under the nonparametric assumption

b. Null hypothesis: true area = 0.5

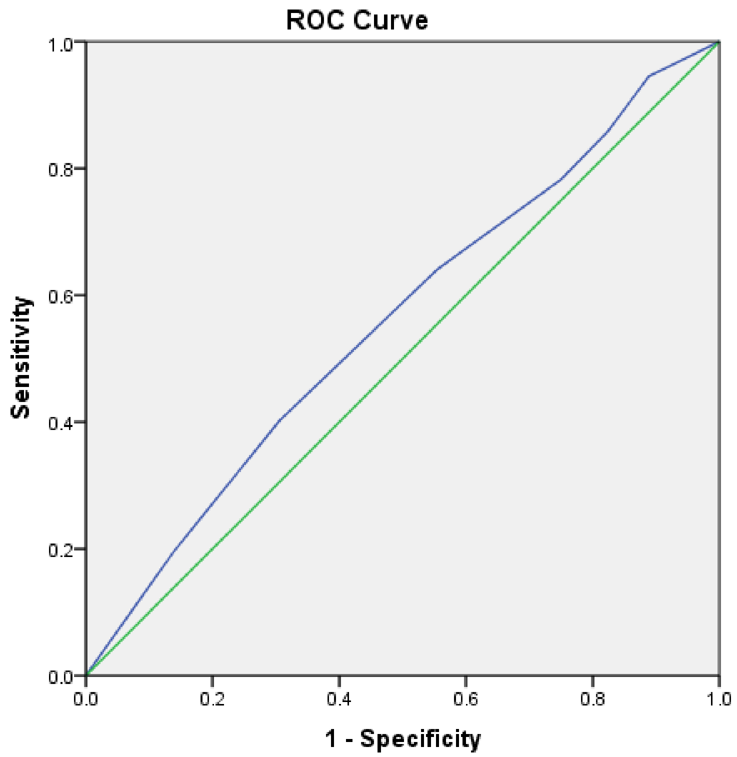
Substance Use

Case Processing Summary

ReoffendYN	Valid N (listwise)
Positive[a]	92
Negative	108

Larger values of the test result variable(s) indicate stronger evidence for a positive actual state.

a. The positive actual state is Yes.



Diagonal segments are produced by ties.

Area Under the Curve

Test Result Variable(s): f104

Area	Std. Error[a]	Asymptotic Sig.[b]	Asymptotic 95% Confidence Interval	
			Lower Bound	Upper Bound
.560	.041	.146	.480	.639

The test result variable(s): f104 has at least one tie between the positive actual state group and the negative actual state group. Statistics may be biased.

a. Under the nonparametric assumption

b. Null hypothesis: true area = 0.5

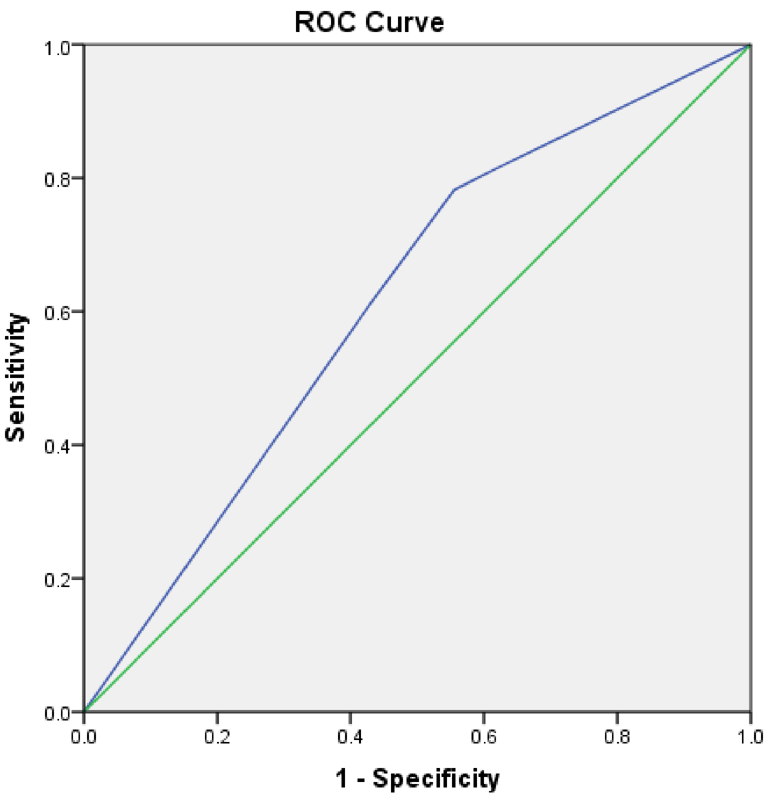
<u>Frequency of Employment</u>

Case Processing Summary

ReoffendYN	Valid N (listwise)
Positive[a]	92
Negative	108

Larger values of the test result variable(s) indicate stronger evidence for a positive actual state.

a. The positive actual state is Yes.



Diagonal segments are produced by ties.

Area Under the Curve

Test Result Variable(s): f105

Area	Std. Error[a]	Asymptotic Sig.[b]	Asymptotic 95% Confidence Interval	
			Lower Bound	Upper Bound
.616	.040	.005	.538	.693

The test result variable(s): f105 has at least one tie between the positive actual state group and the negative actual state group. Statistics may be biased.

a. Under the nonparametric assumption

b. Null hypothesis: true area = 0.5

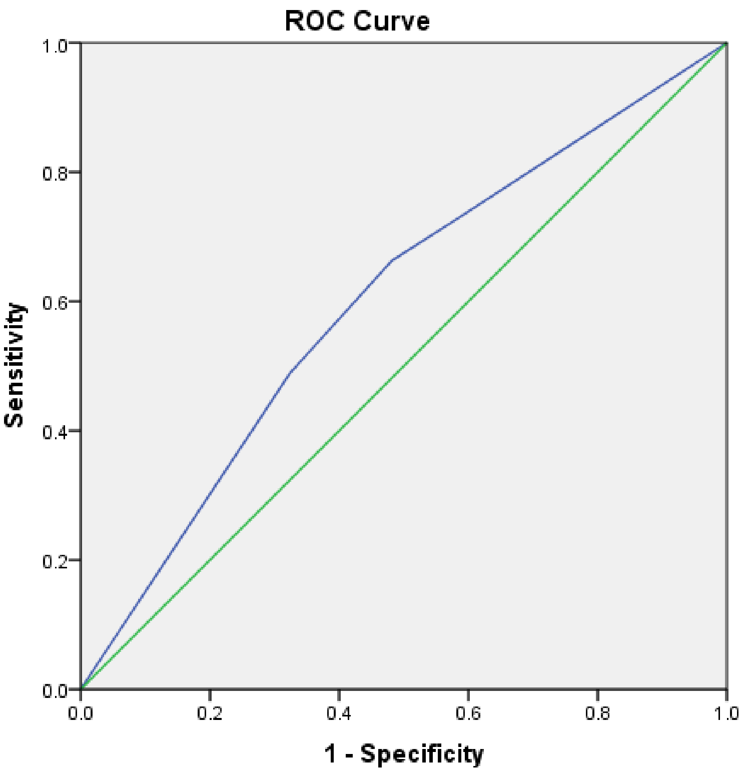
Juvenile Criminal History

Case Processing Summary

ReoffendYN	Valid N (listwise)
Positive[a]	92
Negative	108

Larger values of the test result variable(s) indicate stronger evidence for a positive actual state.

a. The positive actual state is Yes.



Diagonal segments are produced by ties.

Area Under the Curve

Test Result Variable(s): f106

Area	Std. Error[a]	Asymptotic Sig.[b]	Asymptotic 95% Confidence Interval	
			Lower Bound	Upper Bound
.601	.040	.014	.522	.680

The test result variable(s): f106 has at least one tie between the positive actual state group and the negative actual state group. Statistics may be biased.

a. Under the nonparametric assumption

b. Null hypothesis: true area = 0.5

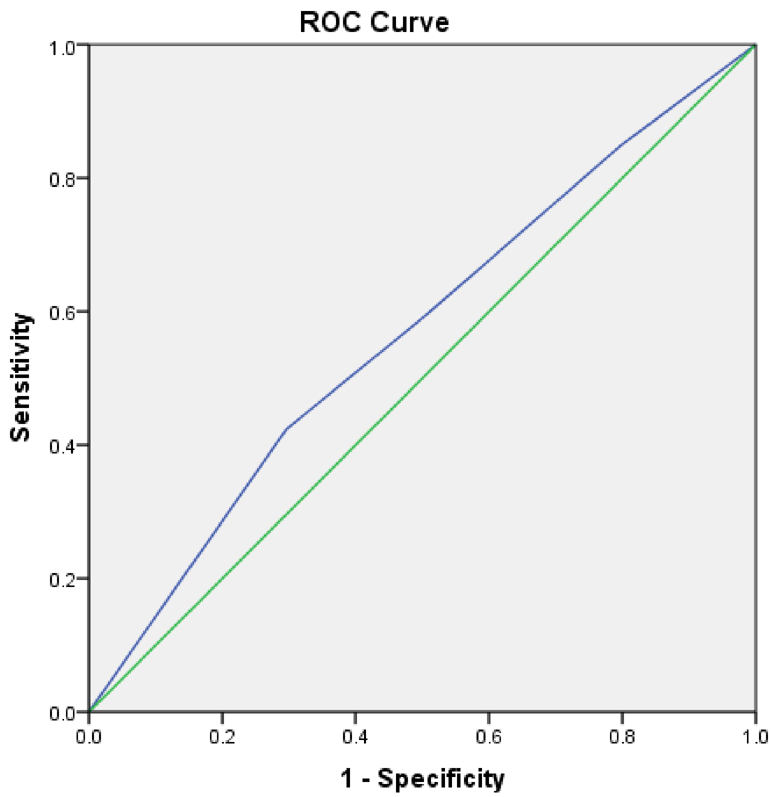
Instrumental Aggression

Case Processing Summary

ReoffendYN	Valid N (listwise)
Positive[a]	92
Negative	108

Larger values of the test result variable(s) indicate stronger evidence for a positive actual state.

a. The positive actual state is Yes.



Diagonal segments are produced by ties.

Area Under the Curve

Test Result Variable(s): f108

Area	Std. Error[a]	Asymptotic Sig.[b]	Asymptotic 95% Confidence Interval	
			Lower Bound	Upper Bound
.567	.041	.101	.487	.647

The test result variable(s): f108 has at least one tie between the positive actual state group and the negative actual state group. Statistics may be biased.

a. Under the nonparametric assumption

b. Null hypothesis: true area = 0.5

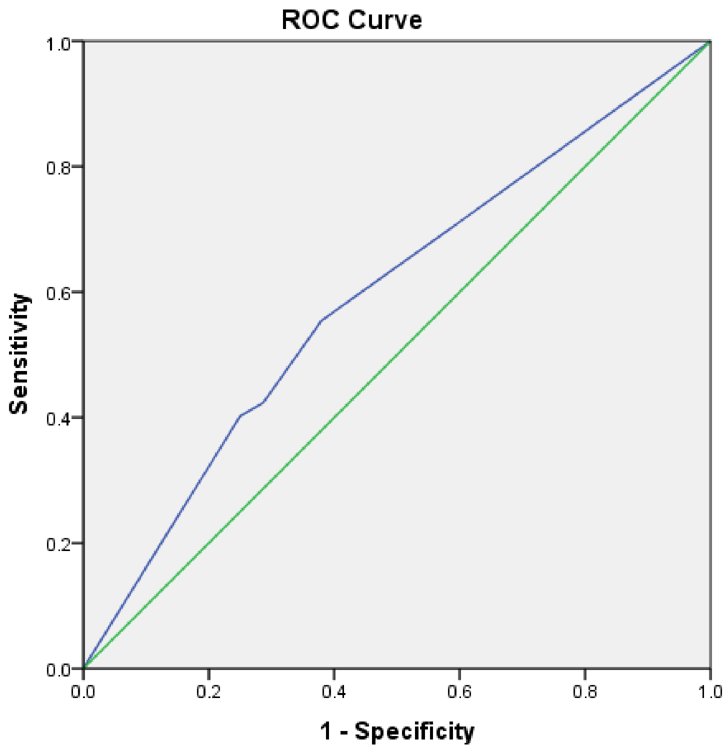
Current Employment

Case Processing Summary

ReoffendYN	Valid N (listwise)
Positive[a]	92
Negative	108

Larger values of the test result variable(s) indicate stronger evidence for a positive actual state.

a. The positive actual state is Yes.



Diagonal segments are produced by ties.

Area Under the Curve

Test Result Variable(s): f103

Area	Std. Error[a]	Asymptotic Sig.[b]	Asymptotic 95% Confidence Interval	
			Lower Bound	Upper Bound
.593	.040	.024	.514	.672

The test result variable(s): f103 has at least one tie between the positive actual state group and the negative actual state group. Statistics may be biased.

a. Under the nonparametric assumption

b. Null hypothesis: true area = 0.5

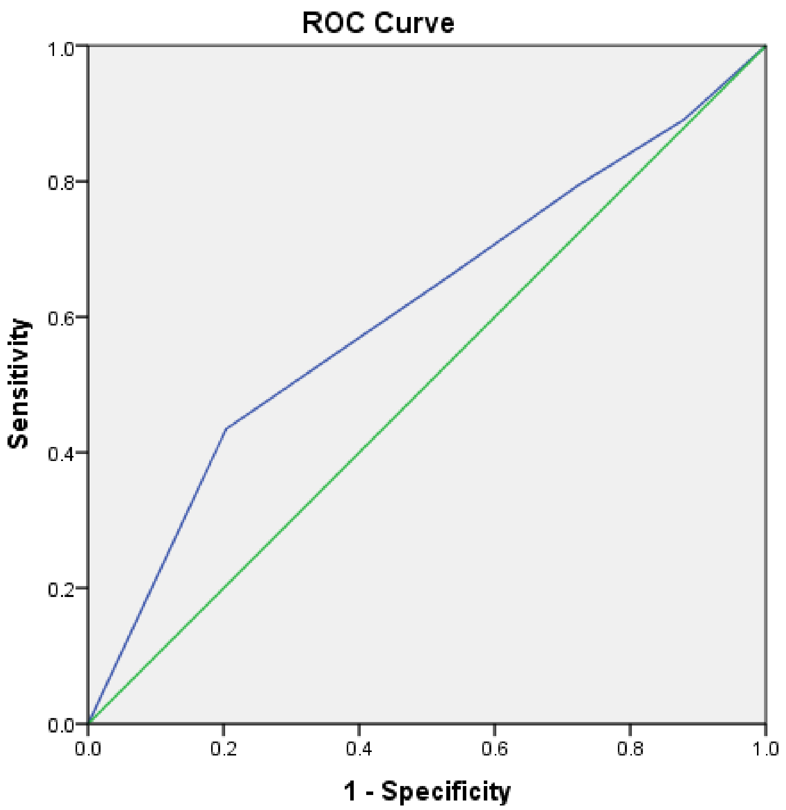
<u>Leisure, Recreation, & Schooling History</u>

Case Processing Summary

ReoffendYN	Valid N (listwise)
Positive[a]	92
Negative	108

Larger values of the test result variable(s) indicate stronger evidence for a positive actual state.

a. The positive actual state is Yes.



Diagonal segments are produced by ties.

Area Under the Curve

Test Result Variable(s): f107

Area	Std. Error[a]	Asymptotic Sig.[b]	Asymptotic 95% Confidence Interval	
			Lower Bound	Upper Bound
.609	.041	.008	.529	.688

The test result variable(s): f107 has at least one tie between the positive actual state group and the negative actual state group. Statistics may be biased.

a. Under the nonparametric assumption

b. Null hypothesis: true area = 0.5

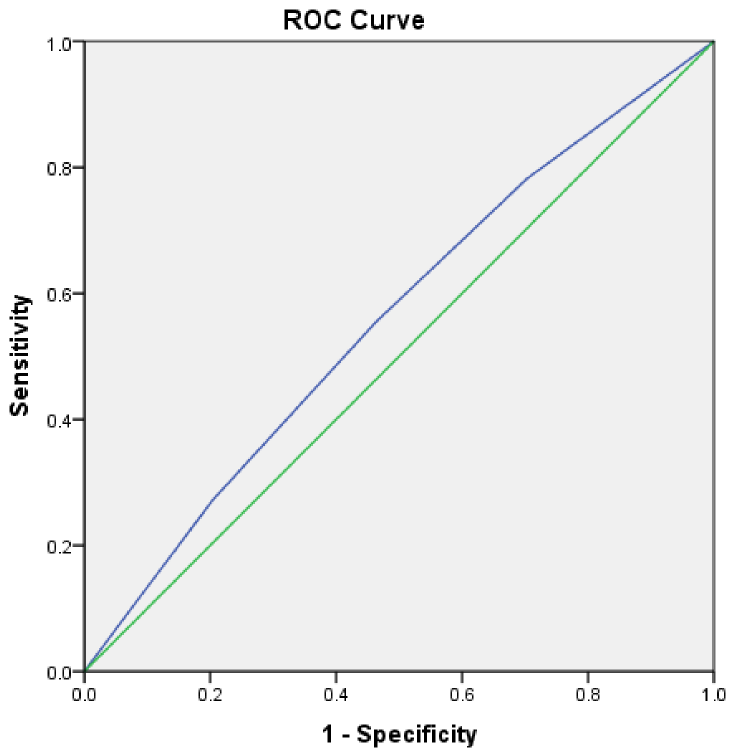
Antisocial Cognitions

Case Processing Summary

ReoffendYN	Valid N (listwise)
Positive[a]	92
Negative	108

Larger values of the test result variable(s) indicate stronger evidence for a positive actual state.

a. The positive actual state is Yes.



Diagonal segments are produced by ties.

Area Under the Curve

Test Result Variable(s): f1010

Area	Std. Error[a]	Asymptotic Sig.[b]	Asymptotic 95% Confidence Interval	
			Lower Bound	Upper Bound
.560	.041	.145	.480	.640

The test result variable(s): f1010 has at least one tie between the positive actual state group and the negative actual state group. Statistics may be biased.

a. Under the nonparametric assumption

b. Null hypothesis: true area = 0.5

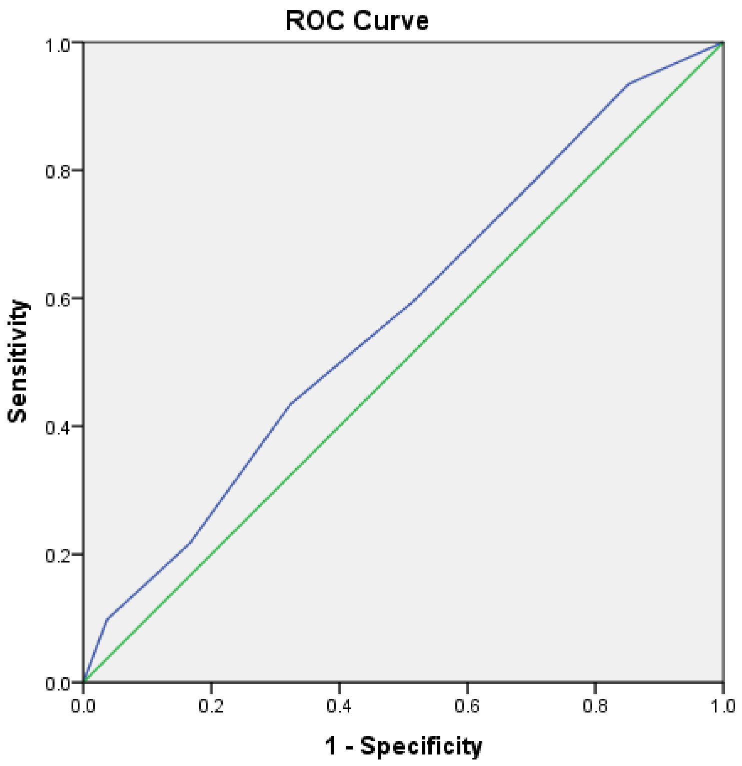
Familial Relationships & Educational Support

Case Processing Summary

ReoffendYN	Valid N (listwise)
Positive[a]	92
Negative	108

Larger values of the test result variable(s) indicate stronger evidence for a positive actual state.

a. The positive actual state is Yes.



Diagonal segments are produced by ties.

Area Under the Curve

Test Result Variable(s): f109

Area	Std. Error[a]	Asymptotic Sig.[b]	Asymptotic 95% Confidence Interval	
			Lower Bound	Upper Bound
.572	.040	.078	.493	.652

The test result variable(s): f109 has at least one tie between the positive actual state group and the negative actual state group. Statistics may be biased.

a. Under the nonparametric assumption

b. Null hypothesis: true area = 0.5

Appendix D

Original 78-item Australian Risk/Need Inventory

Original 78-item Australian Risk/Need Inventory

The items from this scale have intellectual property constraints on them and cannot be published in the public domain. Please contact the author (Heidi Gordon) for access to this scale: hdgordon@utas.edu.au or hdgordon84@gmail.com

Appendix E

Australian Risk/Need Inventory and Scoring Guide

Australian Risk/Need Inventory (ARNI) & Scoring Guide

The items from this scale have intellectual property constraints on them and cannot be published in the public domain. Please contact the author (Heidi Gordon) for access to this scale: hdgordon@utas.edu.au or hdgordon84@gmail.com